A STUDY TO EVALUATE THE EFFECTIVENESS OF INTRADIALYTIC STRETCHING EXERCISE ON PREVENTION AND REDUCTION OF MUSCLE CRAMPS AMONG PATIENTS UNDERGOING HAEMODIALYSIS AT SELECTED HOSPITAL, KANYAKUMARI DISTRICT.

A DISSERTATION SUBMITTED TO THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY, CHENNAI, IN PARTIAL FULFILLMENT FOR THE DEGREE OF

MASTER OF SCIENCE IN NURSING

MEDICAL SURGICAL NURSING (Critical Care Nursing)

BY

301612654

SRESAKTHIMAYEIL INSTITUTE OF NURSING AND RESEARCH

(JKK NATTRAJA EDUCATIONAL INSTITUTIONS)

KUMARAPALAYAM (PO),

NAMAKKAL DISTRICT – 638 183.

OCTOBER – 2018

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BY

301612654

Research Advisor: **....……**

Dr. Mrs. R. JAMUNARANI, M.Sc (N)., Ph.D.,
Principal,
Sresakthimayeil Institute of Nursing & Research,
(JKK Nattraja Educational Institutions)
Kumarapalayam, Namakkal District.

Clinical Specialty Advisor: ……

Mrs. GOWRI, M.Sc., (N),
Reader, HOD, Medical Surgical Nursing,
Sresakthimayeil Institute of Nursing & Research,
(JKK Nattraja Educational Institutions)
Kumarapalayam, Namakkal District.

A dissertation submitted in partial fulfillment of the requirement for the Degree of Master of Science in Nursing to The Tamilnadu Dr. M.G.R Medical University, Chennai.

OCTOBER – 2018

CERTIFIED THAT THIS IS THE BONAFIDE WORK OF

301612654

AT SRESAKTHIMAYEIL INSTITUTE OF NURSING AND RESEARCH

(JKK NATTRAJA EDUCATIONAL INSTITUTIONS)

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EXAMINERS:

1. ……..

2. …….

DECLARATION

I hereby declare that this dissertation entitled **"A STUDY TO EVALUATE THE EFFECTIVENESS OF INTRADIALYTIC STRETCHING EXERCISE ON PREVENTION AND REDUCTION OF MUSCLE CRAMPS AMONG PATIENTS UNDERGOING HAEMODIALYSIS AT SELECTED HOSPITAL,KANYAKUMARI DISTRICT".** It has been prepared by me under the guidance and supervision of **Dr.Jamunarani.R, Ph.D,** Principal Sresakthimayeil Institute of Nursing and Research, Kumarapalayam. **Mrs.Gowri. B, M.sc, Nursing, Head of the department (Medical Surgical Nursing)**, Sresakthimayeil Institute of Nursing and Research, Kumarapalayam. As a partial fulfillment of Master Science in Nursing degree under The TamilNadu Dr.M.G.R Medical University, Chennai this dissertation had not been previously formed and this will not be used for award of any other degree. This dissertation represents independent original work on the part of the candidate.

Place:Kumarapalayam.

Date:

Register Number-**301612654**

M.Sc (Nursing) II year,

Sresakthimayeil Institute of Nursing

and Research,

(JKK Nattaraja Educational Institutions)

Kumarapalayam.

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ABSTRACT

Haemodialysis is a procedure done to manage client with end stage renal failure by using an artificial kidney to replace the excretory function of the failed kidneys. Health personnel's and family members of clients are more concerned with the physiological problems of the patients. Some of the physiological problems are given less or no importance, for example muscle cramps which occurs during haemodialysis. The current study assessed the effectiveness of intradialytic stretching exercise on muscle cramps among patients undergoing haemodialysis at Dialysis unit, JEYASEKHARAN Hospital.

The aim of the study is to reduce the frequency, duration, quality, intensity of muscle cramps. Based on true experimental design – post test only control group design 30 samples were selected and randomized. The intradialytic stretching exercise given for the patients under experimental group at the end of first hour of haemodialysis.The post intervention assessment done at the end of each hour of the cycle. The characteristics of muscle cramps were assessed without any intervention for control group. The findings were given score and interpreted and analysed. The results showed that there was a significant difference between experimental and control group. Initially experiment group patients have 21% score at first day in 2 hours of muscle cramps and control group patients have 32.3% score at first day in 2 hours of muscle cramps after three days in experiment group patients have 15.6%score in forth hours of muscle cramps and control group patients have 40.2%score of muscle cramps and muscle cramps pain reduction difference in percentage at third day 24.6%. Overall the effectiveness of intervention is reduction of muscle cramps between experimental and control group is 5.4%.Experimental

group benefited more than control group. Thus, the study was concluded that intradialytic stretching exercise can be effectively used to reduce the frequency, duration, quality, intensity and decrease the muscle tone of the patients who are undergoing haemodialysis. The intervention given during the haemodialysis session is simple and effective method to treat muscle cramps. Intradialytic stretching exercise can be added as an adjunct treatment for dialysis patients.

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CHAPTER – I

INTRODUCTION

"A muscle is like a car. If you want it to run well early in the morning, you haveto warm it up". - Florence Griffith Joyner.

"Exercise is labor without weariness" - Samuel Johnson (1709-1784).

Kidneys

The vital organ plays a main role in the maintenance of homeostasis mechanism in human body. Healthy kidneys are the sophisticated reprocessing machine that cleans the blood by removing fluid, salt and wastes from the body. Deficit in blood supply to the kidney will lead to decreased function. Prolonged decrease in the blood supply or in the blood pressure will lead to acute or sudden kidney failure.

Chronic Kidney Disease is known to be a universal health problem because of its increasing prevalence and incidence all over the world. Once the kidney stops working, patients cannot sustain life without kidney dialysis or transplantation.

Chronic Kidney Failure is a common clinical syndrome characterized by decline in glomerular filtration, perturbation of extracellular fluid volume, electrolyte and acid base homeostasis and retention of nitrogenous waste from protein catabolism. Chronic renal failure (CRF) results from partial or total loss of renal function. It exists when residual renal function is less than 15% of normal. Renal failure can be treated by dialysis.

Dialysis is an artificial process used to purify the blood. Dialysis will not cure kidney disease but it removes the waste products and excess water from the body and stabilizes the blood chemistries. Haemodialysis removes waste products and excess fluid directly from the blood by pumping it through a filter called a dialyzer, or artificial kidney. A small amount of blood is continually removed from the body, pumped through the dialyzer filter and returned to the body. Only a small amount of blood was taken outside of the body at any time because it is a continuous process. The blood is returned to the body as fast it is removed (**Byton., 2012**).

Haemodialysis is a life saving measure for patients with chronic kidney disease. It is an on going process where patients experience complications such as hypotension, muscle cramps, disequilibrium syndrome and nausea during the procedure. Chronic kidney disease (CKD) has been increasingly recognized as a global health burden. Individuals with CKD are at risk for progressive loss of kidney function and kidney failure. One of the most common treatments for kidney failure is haemodialysis. Worldwide statistics shows that 9, 20,000 people are undergoing haemodialysis per day, which constitutes about 7-8% of the total population.

C.G.Okwuonu(2015) mentioned that 2010 global ranking of premature causes of death show that kidney diseases moved up from position 32 in 1990 to position 24 in 2010.Robert A Star (2012) mentioned that the beginning and ending supportive therapy for the kidney failure is haemodialysis.

World Health Organization estimated that around 1 million new cases of end stage renal disease are detected worldwide every year. Since kidney transplants are much costlier; dialysis becomes the mode of treatment for many . Currently,

there are over 1.4 million people on lifesaving dialysis and the number is growing by 8% every year.

Haemodialysis patient normally feels weak and fatigued sometimes even too tired to eat. Sudden drops in Blood pressure may cause the patient to become weak, dizzy and nauseated. Fluid and electrolyte levels drops rapidly and cause the patient to feel lethargic and have muscle cramps.

Chronic renal failure and its treatment can severely compromise quality of life of people affected by the disease. Caring for the client with CRF involves many challenges. Numerous physical and psychosocial manifestations are associated with renal disease and its treatment. Self management is integral to ensure a good quality of life. Nurses can support self management through education of clients, planning for exercise programs and through supportive communication.

Muscle cramps occur during 5 to 20% of Haemodialysis sessions frequently concomitant with intradialytic hypotension and low dialysate sodium concentration. Muscle cramps result from the constriction of intramuscular arteries in response to depletion of intravascular volume.

Muscle cramping of the hands, feet, and legs is fairly common on haemodialysis. The cause of muscle cramping is unknown. However, three conditions that seem to increase cramping are hypotension, the patient being below dry weight and use of low sodium dialysate solution. A muscle cramp can be explained an involuntarily and forcibly contracted muscle that does not relax. A muscle that involuntarily (without consciously) contracts in a spasm." If the spasm is forceful and sustained, it becomes a cramp. Muscle cramps cause a visible or

palpable hardening of the involved muscle in the calf region. The calf muscles consist of the Gastrocnemius muscle which is the biggest muscle at the back of the lower leg and the Soleus muscle which is the smallest muscle under the Gastrocnemius muscle.

Muscle cramps are more commonly associated with low BP. However, some cramping continues even after a normal blood pressure is obtained. In fact, muscle cramping can occur even without a fall in blood pressure. Muscle cramps also can occur when patients are below the dry weight. The severe muscle cramping experienced near the end of the dialysis treatment and persisting for a time after dialysis oft en is due to dehydration. Treatment for cramping vary from unit to unit. When patients15 are having cramping and have low blood pressure, the staff may give normal saline. This will increase the fluid in your body and muscle cramping may be relieved to some extent. In addition, hypertonic saline or glucose may be given. Heat and mass age for the cramping muscle can ease the pain. For chronic leg cramps they may prescribe Quinine, Carnitine, or another medication. The investigate or had tried a program of gentle stretching and toning exercises targeted at the muscles which may tend to cramp during dialysis.

Exercises also increase the blood flow to muscle and greater amount of open capillary surface area in working muscles which result in a greater flux of urea and associated toxins from the tissue to the vascular compartment helps in subsequent removal of the dialyser. There are different exercises like flexibility exercises and strengthening exercises to improve the physical functioning of the patient. Leg stretch exercises done during the dialysis procedure like quadriceps knee strengthening exercise, hamstring exercise and gluteal strengthening exercise will

improve the muscle protein synthesis and breakdown, which helps in determining both strength and overall function of the body.

The role of exercise in Chronic kidney disease patients is very important and it has a positive effect on physiological and functional function. It is recommended by the National Kidney Foundation (NKF) that patients on dialysis therapy to maintain physical activity with a goal of 30 minutes of moderate intensity activity in most of the days. Another recommendation by **Kidney Disease Improving Global Outcomes (KDIGO)** Chronic Kidney Disease clinical practice guideline is to do exercise for at least 30 minutes 5 times a week minimally. A large and increasing number of studies showed the benefit of exercise during dialysis and indicated the improvement on those patients.

The psychological impact of Muscle Cramps is often overlooked, yet Cramps have a significant impact on patient mood and quality of life. They are scored by haemodialysis patients as a particularly severe individual symptoms are linked with depression and poor quality of life. Repeated episodes of Muscle Cramps contribute to chronic pain, lack of sleep and illness intrusiveness which in extreme cases, has been implicated in patient decisions to ultimately withdraw from dialysis treatment(**British journal., 2012**).

A trial of stretching program is a measure that can be done both for nocturnal leg cramps and for haemodialysis-related cramps triggered by the relaxation of the foot and ankle muscles from the prolonged recliner position for the dialysis treatment. Stretching is usually a first-line treatment for cramps, and pre-bedtime

stretching has been seen as an easy treatment to decrease or eliminate nocturnal cramps **(Hallegraeff,2012)**.

Nephrology/Dialysis nurses are in a unique position to help monitor and evaluate cramp prevention and management techniques.

NEED FOR THE STUDY

Kidney diseases are common in our population. The incidence of chronic kidney disease will rise to 36 million people by the end of 2015 worldwide **(World Health Organisation, 2010)**. In India 10 lakhs people suffer from kidney failure and more than four cores are at risk **(Tamil Nadu Kidney Research Foundation, 2010).** In South India, average of 500 patients register for haemodialysis is each year **(Health Management Centre,2009)**.Chronic kidney disease is likely to escalate rapidly over next 2 decades, (Diabetes Mellitus and Hypertension are increasing at remarkable rates).

Dialysis is a process whereby the solute composition of a solution. It is altered by exposing solution, through a semi permeable membrane. During dialysis many complications occur including hypotension, fatigue, tiredness, muscle cramps etc. One of the main complications which affect the activities of the person is severe muscle cramps.

Fatigue is a debilitating symptom or side effect experienced by many patients on long term dialysis. According to Indian Council of Medical Research, it is estimated that, among 1 billion populations around 7.85 million people are suffering from renal failure.

According to the first report of the Indian Chronic Kidney Disease registry, almost more than 2.5lakhs people die of renal failure in India every year. Journal of Renal care association (2005) reported that the prevalence of Chronic Renal Failure patients in Tamil Nadu 0.47% (0.30% -0.76%).Dialysis is one of the main replacement.

Many studies have shown that hypertension and diabetes are the most common causes of chronic renal failure. In ESRD the patient is unable to survive without a renal replacement therapy either dialysis or kidney transplantation. Renal replacement therapy is considered a burden for the patients. It is a time consuming, costly and once the patient starts it, it may continue for years or for life. Haemodialysis is commonly used as renal replacement therapy among peritoneal dialysis or kidney transplantation. More than 2 million patients are treated with haemodialysis in around 28,500 dialysis units all over the world. The goal of haemodialysis is to remove excess fluid and waste products (uremic toxins) from the blood through the dialyzer and to return a clear and filtered blood back to the patient.

There are different therapies like flexibility exercises and strengthening exercises to improve the physical functioning of the patient. Leg stretch exercises done during the dialysis procedure like quadriceps knee strengthening exercise, hamstring exercise and gluteal strengthening exercise will improve the muscle protein synthesis and breakdown, which helps in determining both strength and overall function of the body. **(Jennifer L Steel 2008).**

Regular physical activity can reduce the complications associated with Chronic Kidney Disease by inducing adaptations in the cardiovascular, nervous, and musculoskeletal systems. This increases the functional capacity and enhances quality of life in patients on HD. Haemodialysis patients can safely participate in a variety of exercise programs with minimal adverse effects. Intradialytic exercise programs that can incorporate aerobic and resistance exercise that promote exercise adherence and should be encouraged on dialysis units.(Brenner I, 2009).

Muscle cramps is a common complication of haemodialysis treatment, occurring in 33 to 86 percent of patients they often result in the early termination of haemodialysis session and are therefore a significant cause of under dialysis. A cramp is a prolonged involuntary muscle contraction that occurs in a muscle that voluntarily contracts when it is already in its most shortened position. The increased frequency of cramps at rest and during the night may be caused by the placement (by the plantar-flexed foot) of the calf and ventral foot muscles in the most shortened and vulnerable position during sleep. The exact etiology of cramps in dialysis patients is unknown. Since cramps tend to occur most frequently near the end of haemodialysis treatment, changes in plasma osmolality and/or extracellular fluid volume have been implicated. **Jean L (2010)**

The most common factors related to the haemodialysis procedure are volume depletion and hyponatremia. Preventing hypotension associated with dialysis, minimizing interdialytic weight gains, increasing the frequency of haemodialysis, have been effective in reducing the frequency of cramps. (Holley &Sheon, 2011)

Performing stretching exercises before dialysis, performing mild exercise such as riding a stationary bicycle during dialysis prevent cramps. Local heat (including showers or baths) or ice, massage, walking or leg jiggling followed by leg elevation, are other methods reported to help relieve muscle cramps (Holley, 2012)

A randomized controlled trials of non drug, non invasive intervention study for lower limb muscle cramps was conducted. Participants of age 60 years or over and had received a repeat prescription of quinine for night time cramps in the preceding three months were selected. Forty nine participants were advised to lean wall calf muscle stretching held for 10 seconds three times per day. Forty eight participants were allocated to a placebo stretching group. After 12 weeks there was no significant adverse effect was reported. This study concluded that there is an urgent to evaluate the commonly recommended and emerging non drug therapy (Blyton F, 2012).

Magnard(2013) illustrated that haemodialysis is an epoch-making medical technology introduced clinically in the early 1960's which made it possible to prolong the lives of patients with chronic kidney disease. Haemodialysis is usually done for twice or thrice in a week with each session lasting about four or six hours. The patient quality of life can be promoted and the complications of renal failure can decrease with sufficient and effective haemodialysis.

Holley (2012) stated that muscle cramps (involuntary muscle contraction associated with severe pain) occur frequently in patients receiving dialysis. Muscle cramps can involve the legs, most commonly in the feet, but can also involve arms and hands, as well as abdominal muscles. Muscle cramps begin with fasciculations or muscle

twitches and are felt to be related to nerve conduction rather than the muscles themselves.

The National Kidney Foundation of Italy recommended counseling by nephrologists to increase patients levels of physical activity in their guideline about management of cardiovascular disease. The guideline focused on well-being and functional capacity of renal patients. Patients should be counseled and encouraged by nephrology and dialysis staff to increase their level of physical activity. **(AucellaF,2014).**

Staff in dialysis unit have a crucial role to encourage and assist patients during intra-dialysis exercise, but other professionals should be included in the ideal "exercise team" for dialysis patients. In this scenario, dialysis nurses play a pivotal role since they guarantee a constant and direct approach. **(Capitanini .A,et al., 2014).**

According to Indian Journal of Nephrology (2014), approximately 9-13% of patients on haemodialysis in India die within 1 year.

Many interventions are available for lower limb cramps but some are controversial and no treatment guidelines exist and often people experience no benefit from the interventions prescribed. Hence there is a need to practice some interventions for muscle cramps during haemodialysis. Intradialytic stretching exercises helps to improve the efficacy of haemodialysis thus preventing or reducing the muscle cramps.

Throughout the entire illness the nurses play a crucial role in providing information, support, understanding and therapeutic care to the patients and the family members who care for the patients with kidney disease. Therefore it is essential to provide therapeutic care to the patients who are undergoing haemodialysis, to provide intradialytic stretching exercise prophylactically during haemodialysis session to relieve muscle cramps.

STATEMENT OF THE PROBLEM

'A study to evaluate the Effectiveness of Intradialytic Stretching Exercises on Prevention and Reduction of Muscle Cramps among Patients undergoing Haemodialysis at dialysis unit Jeyasekharan Hospital, Kanyakumari district'.

OBJECTIVES :

1. To assess the characteristics of muscle cramps among control group.

2. To assess the characteristics of muscle cramps among experimental group after intervention.

3. To evaluate the effectiveness of intradialytic stretching exercises on muscle cramps among experimental group.

4. To associate the effectiveness of intradialytic stretching exercise with selected demographic variables.

HYPOTHESIS

H_1 : There will be a significant effectiveness of intradialytic stretching exercise on reducing muscle cramps among Haemodialysis Patients in experimental group.

H_2 : There will be a significant association between the post level of effectiveness of intradialytic stretching exercise on reducing muscle cramps among. Haemodialysis and their demographic variables in experimental group.

ASSUMPTIONS:

- Muscle cramps reduce the efficacy of haemodialysis.
- Muscle cramps limit a patient's ability to tolerate the complete session of haemodialysis.
- Exercises restores blood flow and relaxes the muscle tightness.
- Intradialytic stretching exercises helps to reduce the discomfort related to muscle cramps during haemodialysis.

OPERATIONAL DEFINITIONS:

Effectiveness :

In this study, It refers to the prevention and reduction of muscles cramps among patient undergoing Haemodialysis after Muscle stretching exercises.

Muscle Stretching Exercise

It is a form of physical exercise in which a specific muscle or tendon or group of muscles deliberately flexed or stretched in order to improve the muscles felt elasticity and achieve comfortable muscle tone. Flexing the knee joint of the patient and pulling the heel down slowly and simultaneously flex the foot until the patient report a feeling of stretch in the calf region.

Muscle Cramps

Muscle cramps is a sudden and involuntary contraction of one or more muscle. In this study it refers to painful involuntary muscle contraction felt in the calf, gastrocnemius, soleus, hamstring and quadriceps muscles of the patients undergoing haemodialysis

Intradialytic

Pertaining to the end of first hour of a four hour haemodialysis session.

Haemodialysis

The process that involves removing the waste products and excess fluid from the blood by passing it through a machine (dialyser) with a semi permeable filter.

Hemodialysis Patients

Patients those who are undergoing Haemodialysis .

DELIMITATIONS:

- In this study the intradialytic stretching exercises were limited only to the lower limb cramps.
- The study is limited to 30 subjects only.
- The study period is limited to four weeks only.

THEORY APPLICATION

CONCEPTUAL FRAMEWORK:

A frame work as a brief explanation of theory of those portions of theory which to be tested in a study. Conceptual framework serves as a mind map for the work as well as spring board for scientific advancements.

A theoretical frame work of reference that is based for observations, definition of concepts research designs, interpretations and generalizations .It provides the rationale for the predictions about relationship among variable in the research study. (**B.T.Basavanthappa, 2010)**

The present study aims at evaluating the effectiveness of Intradialytic stretching exercise on reducing muscle cramps among Haemodialysis patients with admitted in dialysis unit of Jeyasekharan Hospital, Kanyakumari. Hence the investigator has modified the General systems theory developed by Ludwig von Bertalaffy(1968).

According to systems theory a system is a group of elements, which are considered to be individuals and their environment. An individual is capable of taking energy and information as input from environment and releases them to environment. This input when proceeded provides an output and continues to be so, as long as these four parts keep interacting .If there are changes in any of these parts, there will be changes in all the parts. This system is cyclic in nature that interacts with one another in order to achieve the goal. Feedback from within the system or from the environment provides information, which helps the system to determine whether it meets its goal. Feedback from within the system or from environment provides information, which helps the system to determine whether it meets its goal. In this present study, these concepts can be explained as follows.

INPUT

Input refers to the process by which the system receives energy and information from the environment. According to this theory, patient is a system and has input within the system itself(subsystem)and acquired from the environment (suprasystem).

In this study the input (subsystem) includes patients background like age, gender, etc.., which may influence the performance of patient and input (suprasystem) refers providing intradialytic stretching exercise on reducing muscle cramps among Haemodialysis patients who is admitted in Jeyasekharan Hospital, Kanyakumari.

THROUGHPUT

It is the process that occurs in between the input and output process which enables the input to be transferred on output in such a way that it can be readily used by the system.

In this study throughput refers to the process of transformation of practice and performance of intradialytic stretching exercise on reducing muscle cramps among Haemodialysis patients who is admitted in Jeyasekharan Hospital, Kanyakumari.

OUTPUT

Output is the end result or products of the products of the process. After processing the input, the system release the energy, and information to the environment as output.

In this study output refers to the gain in score of numerical pain scale by haemodialysis patients with muscle cramps in the experimental group which is compared with patients in the control group.

FEEDBACK

Feedback refers to the process by which information is received at each stage of the system and is feed back as input to guide and direct the evaluation. It is the process that provides information about the systemic output.

Accordingly, the higher scores obtained by patients with muscle cramps in the post test indicate that the intradialytic stretching exercises was effective in increasing the reduction of muscle cramps in haemodialysis patients and hence it has to be evaluated or alternative measures to be taken(if not effective) which is not included in the present study.

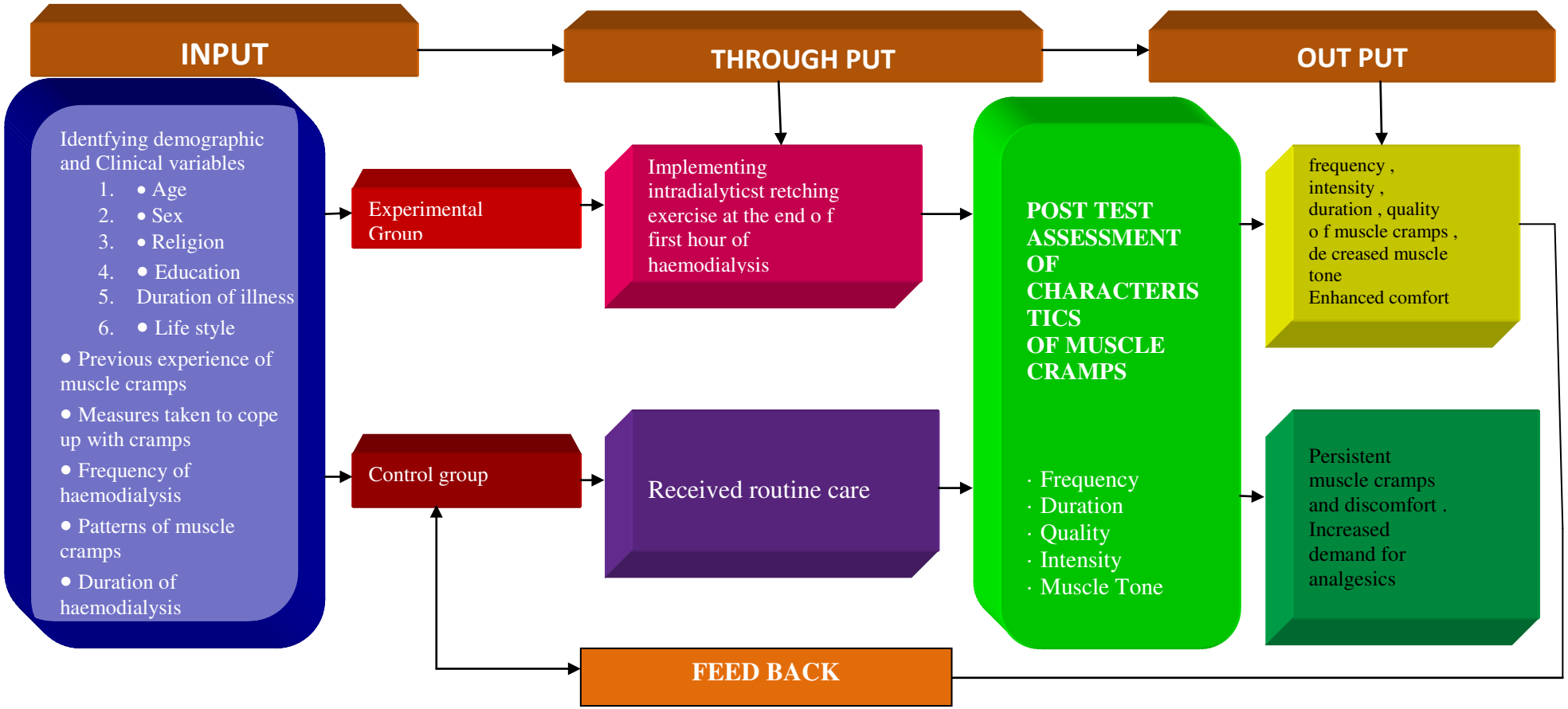


FIG. 1.1: CONCEPTUAL FRAMEWORK BASED ON GENERAL SYSTEM THEORY OF LUDWIG VAN BERTALANFFY THEORY TO ASSESS THE EFFECTIVENESS OF INTRADIALYTIC STRETCHING EXERCISES ON PREVENTION AND REDUCTION OF MUSCLE CRAMPS

CHAPTER – II

REVIEW OF LITERATURE

"A great literature is chiefly the produce inquiring minds in Revolt against the immovable certainties of nations"

- **Mencken H.L**

Review of literature is an important component in research process. Review of literature is a written summary of the state of evidence on a research problem. It should provide readers with an objective, well organized synthesis of the current state of evidence on a topic. It should be neither a series of quotes nor a series of abstracts. The central tasks are to summarize and critically evaluate the overall evidence so as to reveal the current state of knowledge on a topic with regard to themes deemed to be important –not simply to describe what researchers have done.

According to **B.T. Basavanthappa**, review of literature is defined as a broad comprehensive in- depth, systematic and critical review of scholarly publication and unpublished scholarly print materials. These publications were the foundation to carry out the research work.

This chapter deals with the collected information relevant to the present study through the published materials. These publications were the foundation to carry out the research work.

For the present study the investigator reviewed and organized the literature related to effect of intradialytic stretching exercises on fatigue and muscle cramps among persons undergoing Hemodialysis under the following headings.

I. Literature related to muscle cramps.

II. Literature related to stretching exercise.

III. Literature related to the effectiveness of stretching exercise on muscle cramps during haemodialysis.

I. LITERATURE RELATED TO MUSCLE CRAMPS

Kafkia T (2014) conducted a study on assessment and management of pain in haemodialysis patients at cryptus. In this study 70 renal patients on haemodialysis were the subjects. Their pain levels were assessed using numerical intensity pain scale and Wong baker pain scale and McGill pain questionnaire. Around 46% of subjects pinpointed internal pain in the legs, which they were managing either with they were managing either with warm towel, massage or painkiller. It was concluded through this study that pain is affecting the everyday life of renal patients.

Chatrath H (2012) conducted a study on association of prevalence and morbidity with muscle cramps in patients during hemodialysis session. Sample size was 150 adult patients with muscle cramps who were selected by consecutive sampling technique. Cramps questionnaire and visual analogue scale were used to measure the muscle cramps. The result showed that 67% had muscle cramps during dialysis and this study concluded that the muscle cramps is associated with muscle cramps.

Stewart WK, Fleming LW (2010) conducted a study on muscle cramps during maintenance hemodialysis. In this study out of 397 patients who underwent dialysis, 195 developed muscle cramps due to low sodium fluid(49%) compared with only 131 had muscle cramps out of 563 dialyses with high sodium fluid(23%). This study concluded that the cause of muscle cramps was plasma volume contraction.

Feldman (2009)studied on the Effects of L-Carnitine on Dialysis-Related Hypotension and Muscle Cramps. A Meta analysis was done for the adult patients with end-stage renal disease receiving long-term haemodialysis . Random-effects pooled odds ratio for intradialytic cramping or hypotension in L-carnitine–treated participants . Of 317 potentially relevant patients , (total enrollment of 193 patients) met criteria for inclusion.90% of patient reported results for both hypotension and cramps,46% had results for only hypotension, and 44% reported results for only cramps. Using data from all relevant trials , the pooled odds ratio for cramping after L-carnitine supplementation was 0.30(P = 0.05). Analysis of examining the response of intradialytic hypotension to L-carnitine supplementation yielded a pooled odds ratio of 0.28(P = 0.2). Although suggestive in the case of muscle cramping, the available evidence does not confirm a beneficial effect of L-carnitine supplementation on dialysis related muscle cramping or intradialytic hypotension.

Al -HumoudH.Mm (2008)conducted a prospective randomized study on the effect of profiled haemodialys is on intradialytic symptoms was under taken among patients recruited between September 2008 and December 2008 in Churchill Hospital, London. The study evaluated intradialytic symptoms included hypotension, muscle cramps, dizziness, headache, nausea, discomfort , thirst , and

shortness of breath. Symptomatic patients were allocated to one mode of combined sodium and ultra filtration profile during haemodialysis . On standard haemodialysis 40 (36.4%) patients were symptomatic. Hypotension was reported in 29 (72.5%) of patients receiving standard treatment. Muscle cramps were reported in 22 (55%) patients, respectively. These symptoms were significantly ($P < .05$) improved at 2, 4, and 6weeks of profiling. Other symptoms, such as discomfort, nausea,23vomiting, and thirst, were infrequently reported among patients without or with profiling.

II. LITERATURE RELATED TO STRETCHING EXERCISES

Susan Heiwe (2012) conducted a phenomenographic study on patients perspectives on the implementation of intradialytic cycling at Stockholm, Sweden. 8 samples were selected for this study using purposive sampling technique. The subjects did 30 minutes of intradialytic cycling at an intensity of 13-15 minutes. The study revealed that the implementation of intradialytic cycling was experienced as positive. Hence identification of motivators in direct care is important to improve the standards of intradialytic cycling.

Fiona Hawke (2012) conducted a study on non drug therapies for nocturnal lower limb Muscle Cramps in which, the researcher selected 80 people older than 55 year and 6 weeks intervention of calf and hamstring muscle stretch was given to the intervention group where as control group lacks intervention. After six weeks, the mean difference in change of Cramps frequency between group was – 1.2 (95%, cl – 0.6 to -1.8) Cramps per night in favour of the stretching group. This difference represents 35% reduction in Cramps frequency with stretching.

Tare du Jung (2011) conducted a study on intradialytic programs for hemodialysis patients. The exercise programme consists of two or three times a week during hemodialysis with the moderate intensity for 30 minutes and lasting from eight weeks to twelve months. The researcher used Borg's 15 point scale for rating of perceived exertion. The study reveals that there is beneficial effect of intradialytic exercise in end stage Renal Disease patients, hence intradialytic exercise are needed in haemodialysis patients.

SherifTawil (2010) conducted a study on practice of using quinine for leg Cramps in patients receiving dialysis. In the study of 23 trials found that quinine 300mg daily for a period of two months reduced number of Muscle Cramps over two weeks by 28%, Muscle Cramps intensity by 10% and Cramps days by 20%. The researcher conclude that therapy with quinine up to 60 days was effective with no serious adverse events.

Musa (2010) conducted a study to assess the effect of quinine administration and vitamin E for Muscle Cramps. He selected 29 patients on haemodialysis and divided into two groups as the experimental and the control group One group of 16 patients received 325mg of quinine daily and the other group of 13 patients received vitamin E 400 IU daily for a period of two months. the study reveals that quinine reduced Muscle Cramps to 3.3 per month and vitamin E to 3.6 per month (P at 0.005 for both groups) and this conclude that both treatment reduced pain severity due to Muscle Cramps.

Samra (2010) conducted a study to assess effect of l- carnitine on quality of life,20gm of carnitine was given for 8 weeks. The findings showed that carnitine supplementation results in increased haemoglobin level and decreased creatinine level.

Devins (2010) conducted a prospective longitudinal study on exercise program to enhance physical performance and quality of life of older haemodialysis patients. By convenient sampling technique, nine participants were selected and exercise programme was performed for three weeks and measured by duke activity index. The study reveals that patients showed a gradual increase in the amount of exercise performance over 12 weeks. Hence the researcher concludes these exercise program should benefits in the improvement of quality of life in above 60% among haemodialysis patients.

Mika L Nonoyama (2010) conducted a prospective longitudinal study on exercise program to enhance physical performance and quality of life of older haemodialysis patients at Toronto. The objective of the study was to evaluate the feasibility of implementing a combined in-hospital and home based exercise program in older haemodialysis (HD) patients at a university hospital. A convenience sample of 9 older patients (>55 years) undergoing haemodialysis underwent an individualized exercise and strength exercise and patient education. The study concluded that the exercise program and the outcome measures were feasible for the old haemodialysis patients.

ParvizKhajebdehi (2009) conducted a randomized, double-blind, placebo controlled trial of supplementary vitamin E, C and their combination for treatment of haemodialysis Cramps. He randomized 60 haemodialysis patients into four groups. Each group (n= 15) received six identical capsules daily for 8 weeks, containing one of the following: vitamin e (400g), vitamin C (250g), their combination. The frequency and intensity of haemodialysis Muscle Cramps decreased significantly in all three vitamin groups compared with the placebo group.

At the end of trial, vitamin E,C, their combination and place to produced Cramps reduction of 54%, 61%, 97% and 7% respectively. Hence the researcher concludes that short-term treatment with the combinations of vitamin E and C is safe and effective in reducing haemodialysis Muscle Cramps.

TzungChang(2009) conducted a study on effectiveness of creative monohydrate treatment on alleviation of Muscle Cramps associated with haemodialysis. He selected ten patients with frequent Muscle Cramps during haemodialysis. He administered 12mg of creatine monohydrate before each dialysis session for 4 weeks to the study group. The incidence of Muscle Cramps during haemodialysis was compared between the two groups. Dialysis adequacy, hemodynamic status and side effects were also evaluated. At the end of 4 weeks the frequency of symptomatic Muscle Cramps decreased by 60% in the creative monohydrate treatment group. Hence this data suggest that creatine monohydrate can reduce the incidence of haemodialysis associated Muscle Cramps.

Wells (2009) conducted a study to assess quantitatively the efficacy of quinine in treatment of nocturnal leg Muscle Cramps. He selected 107 patients and quinine sulphate was administered for 4 week periods. The researcher conclude his study that treatment with quinine sulphate reduce the number of night Cramps by 27.4%.

Mini Gupta (2008) conducted a study on prevention of haemodialysis related Muscle Cramps by intradialytic use of sequential compression devices. He selected four audit patients (mean age 61± 14 years) on thrice weekly haemodialysis who experienced two or more episodes of lower extremity Cramping weekly in the

month before the study. The sequential compression device were applied on both legs before each dialysis and compression were intermittently applied at 40mmHg during treatment. As a result all four patients reported complete resolution of Cramping during the study period. Hence the researches concludes application of sequential compression device to lower extremity may prevent the generation of lower extremity haemodialysis related Cramping in a selected group of patients.

Liobet (2008) conducted a comparative study on effectiveness of hypertonic, glucose Vs normal saline for Muscle Cramps during dialysis. He selected 44 patients and he administered hypertonic glucose for 26 patients and normal saline for 18 patients. Treatment with hypertonic glucose reveals reduction of Muscle Cramps for17of26 patients, in contrast to only 5 of 18 episodes relieved with 50ml of normal saline ($P<0.016$). Hence the researcher concludes that hypertonic glucose seems to be safe and effective for the relief of dialysis induced Cramps comparing with 50 ml of normal saline for Cramps during dialysis.

Bressan LR (2008) conducted a study on the effects of muscle stretching and physical conditioning as physical therapy treatment for patients with fibromyalgia. Based on American college of Rheumatology, about 15 women with a diagnosis of fibromyalgia were selected and divided into two groups, namely muscle stretching and physical conditioning program. They were evaluated for sleep quality, pain modulating factors, associated symptoms and medications used. The result revealed that the muscle stretching had a positive impact on fibromyalgia.

III. LITERATURE RELATED TO INTRADIALYTICSTRETCHING EXERCISES ON MUSCLE CRAMPS DURINGHAEMODIALYSIS

Basemath.S.S. Morris (**2014).** A pre experimental study to assess the effect of intradialytic stretching exercises on muscle cramps among patients undergoing haemodialysis was conducted in selected hospitals at Chennai. Forty five patients undergoing haemodialysis who experienced muscle cramps were included purposively. Intradialytic exercises were performed every 30 minutes during the last two hours of dialysis. It was found that in the pretest 53.3% had severe muscle cramps, 46.7% had moderate muscle cramps. After performing the exercises 40% had no cramps, 24.4% had mild and 35.6% had moderate cramps. The study concluded that intradialytic stretching exercises during the last two hours of haemodialysis helps to reduce and prevent the muscle cramps.

Gowthami (2014) conducted study on the effectiveness of intradialytic stretching exercise on muscle cramps among patients undergoing hemodialysis in a selected hospital at Mangalore". A quasi experimental design was used in this study and purposive sampling technique was adopted. Sample size was 30 CRF patients were selected. Modified Numerical Intensity Scale was used. The result revealed that there was a significant difference between the pre and post test muscle cramps score in the interventional group (50.297, $p<0.05\%$). This study concluded that intradialytic stretching exercise was effective in reducing muscle cramps among CRF patients undergoing haemodialysis.

Abbazi Z (2013) conducted a study to assess the effect of intradialytic stretching exercise on severity of symptoms of muscle cramps and quality of sleep

in haemodialysis patients at Tehran. Random sampling method was used in this study. A total number of 37 haemodialysis patients were chosen by randomized sampling methods. Patients performed a 30 minutes stretching exercise on legs three times a week, during the last two hours of every haemodialysis session for 8 weeks. Severity of muscle cramps and quality of sleep were assessed by the Numerical intensity scale and Pittsburgh Sleep Quality Index (PSIQ). The result revealed that at the end of 8weeks, the exercise group (n= 17) had a significant improvement in symptoms of muscle cramps and quality of sleep compared with the control group (n= 16). (p<0/001),(p=0/003).The conclusion of this study showed stretching exercises are effective in reducing muscle cramps symptoms and improving quality of sleep in haemodialysis patients.

Hallegraeff.J.M (2013). A randomized controlled trial was done in Hanze University, Groningen to assess the stretching before sleep reduces the frequency and severity of nocturnal leg cramps in older adults. Eighty adults over 55 years with nocturnal leg cramps who were not being treated with quinine were selected. Pre test post test with comparison group design was adopted. Participants recorded the frequency of nocturnal leg cramps. At six weeks, the frequency of nocturnal leg cramps decreased significantly more in the experimental group with the mean difference of 1.2 cramps per night (95% CI 0.6 to 1.8). The severity of the nocturnal leg cramps had also decreased significantly more in the experimental group than in the control group with the mean difference 1.3 cm (95% CI 0.9 to 1.7) on the 10-cm visual analogue scale. The study concluded that stretching before going to sleep reduces the frequency and severity of nocturnal leg cramps in older adults.

Catherine Sullivan (2013)conducted a study on effectiveness of intradialytic massage on leg cramping among haemodialysis patients. A total number of 32 haemodialysis patients with frequent lower extremity cramps during treatment were included in this study and were equally divided into interventional and control group. A 20 minutes massage to the lower extremity was given to the interventional group and the control group received usual care by dialysis centre staff. The results showed that the patients in the interventional group reported decreased incidents of cramping at dialysis than the control group. This study revealed that the effectiveness of intradialytic massaging on cramping during dialysis.

Ahsan M (2010). A study was conducted in Michigan, U.S.A to prevent the haemodialysis related muscle cramps by intradialytic use of sequential compression devices. Four patients on thrice-weekly haemodialysis who experienced two or more episodes of lower extremity cramps weekly in the month before the study were selected. Sequential compression devices were applied before each haemodialysis on both the legs and compressions were intermittently applied at 40 mmHg during treatment. All four patients were reported the complete resolution of cramping during the study period that lasted 1 month or 12 consecutive dialysis treatments. The study concluded that application of sequential compression devices to lower extremity may prevent the generation of lower extremity haemodialysis -related cramping in a selected group of patients.

Fabrice A Giordano (2010)conducted a randomized controlled trials in testing the effects of exercise in dialysis patients. They tested the feasibility of a supervised intradialytic resistance band exercise training program, and its effects on

physical function. A total of 11 unselected adult patients from the centre, aged 70+(10.7) years, including 8 men and 3 women, accepted to follow the program under the supervision of qualified physiotherapists. Thirty-six exercise sessions of moderate intensity (twice a week, mean duration 40 minutes each) mainly involving leg muscles against an elastic resistance, were performed. The exercise program was well tolerated and all patients completed it. Statistically significant improvements were26 observed in the following test (P = .022). The result revealed improvements in the six minute walk distance and in the one-leg balance tests reached statistical significance.

Joline LT Chen (2010)conducted a performance testing on the effects of exercise during haemodialysis on physical performance and nutritional assessment. In an outpatient setting 130 patients were selected for the study and exercise programme including cycling, walking, stretching, light weight exercise were implemented. Each intervention given for 60 seconds. Patients chart were reviewed for episodes of intradialytic cramping. The result shows that all the patients showed improvement of physical performance at 3 months(p=0.05), at (p=0.02). Thus, they concluded that a formal intradialytic exercise regimen can improve the physical performance.

Dan Bayliss (2009)performed a systemic review in starting and managing an intradialytic exercise program for end stage renal disease patients can become a reality and a standard treatment of care for dialysis patients. The goal of this article is to define the components needed to begin and manage an effective intradialytic exercise program. This article describes how the University of Virginia Renal Services incorporated an exercise program and has found success with adherence to

the program from staff and patients. Patients are encouraged to exercise at least 12 days during that month (out of a possible 13 or 14 dialysis days for patients that run 3 dialysis sessions per week). With proper commitment from administration and staff, an exercise program for acute renal failure patients can become a reality and a standard treatment of care for dialysis patients. Intradialytic exercise programs are import ant to enhance patient physical functioning, exercise capacity, and improve overall health. Finally this became a standard treatment.

Samuele M Marcora (2009)performed a new approach on haemodialysis patients who are characterized by muscle wasting and consequently decreased physical functioning and poor outcome. Although this novel exercise programme, utilizing high intensity interval t raining was safe, clinically feasible and beneficial in terms of physical functioning. The 12 weeks of intradialytic exercise programme was beneficiary for the patients treated in a community-based hospital, Taipei. The result revealed that exercising patients have shown improvements in physical fitness and psychological function.

McMurray A (2008) conducted a study to assess the effect of intradialytic foot pedal exercise on blood pressure and muscle cramps in haemodialysis patients at Western Australia. A total number of 17 patients were selected by using convenient sampling technique. The effects of a programme of intradialytic foot pedal exercise on patients blood pressure and level of muscle cramps was recorded and categorized according to the duration and consistence of pedaling. Blood pressure and muscle cramps were measured prior to haemodialysis and then at 4 weeks intervals. This concluded that the effect of intradialytic foot pedal exercise on blood pressure and muscle cramps in haemodialysis patients.

CHAPTER – III

RESEARCH METHODOLOGY

Methodology of research is a way to find out the result of given problem on a specific matter or a problem that is also referred as research problem.

Redmann and Mory,(2009)

The present study is designed to find out the Effectiveness of intradialytic stretching exercises on prevention and reduction of muscle cramps among patients undergoing haemodialysis.

The study was conducted by adopting the steps of research process such as research design, setting, selection of population and sampling, criteria for selecting the samples, instruments and tool for data collection and method of data analysis. Pilot study was conducted and changes were incorporated.

RESEARCH APPROACH

A research approach is the most essential part of any research the entire study is based on it. A research approach tells the research so as to what data to collect and how to analyse. It also suggest possible conclusions to be drawn the data in view of the nature of problem selection.

In order to accomplish, the objectives of the study, an evaluative approach was used in the study as it is to evaluate the effectiveness of intradialytic stretching exercises on reduction of muscle cramps in haemodialysis patients admitted in Jeyasekharan hospital, Kanyakumari.

RESEARCH DESIGN

The research design is the master plan specifying the methods and procedures for collecting and analyzing the needed information in a research study.(**Suresh K Sharma)**

The research design selected for in this study is **True Experimental design -post test only control group design .**

True Experimental design -post test only control group design which comprises of random, control and manipulation.

GROUP	INTERVENTION	POST TEST		
EXPERIMENTAL GROUP	**X**	O_1	O_2	O_3
CONTROL GROUP		O_1	O_2	O_3

**Keywords = ** E - Experimental group

C - Control group

X – Intervention

O1 - Observation at the end of second hour during haemodialysis.

O2 - Observation at the end of third hour during haemodialysis.

O3 - Observation at the end of fourth hour during haemodialysis.

Experimental Group

The intradialytic stretching exercise given for the patients under experimental group along with routine care.

Control Group

To abide the ethical principles routine treatment given for control group as prescribed and permitted.

SETTING OF THE STUDY

The study setting is the location in which the research is conducted. It could natural, partially controlled, or highly controlled. The selection of setting is based on the feasibility, availability of subjects and geographical proximity. **(Suresh K Sharma 2013**).

Setting refers to the physical location and conditions in which data collections has been taken place.

This study was conducted in dialysis unit of **Jeyasekharan Hospital** Kanyakumari. The hospital is a multispeciality hospital and research centre with bed strength of 350. The hospital is certified by national accredited board for hospitals and health care provider (NABH).The dialysis department of this hospital which has bed strength of 10. The total number of patients undergoing haemodialysis for each month is 100 and each day they have three shifts with the population of 30 patients.

VARIABLES OF THE STUDY

Variables are qualities, properties or characteristics of person, things or situations that change or vary. **VARIABLES** at different level of abstraction that are concisely defined to promote their measurement or manipulation within the study

(**Chin and Karmer, 2010)**

Independent variable

It is a stimulus or activity that is manipulated or varied by the researcher to create the effect on the dependent variables. (**Shivani Sharma, 2011**)

In this study independent variables intradialytic stretching exercises .

Dependent variable

It is the outcome or response due to effect of the independent variable, which the researcher wants to predictor explain. (**Shivani Sharma, 2011**)

In this study dependent variables study is prevention and reduction of muscle cramps.

Demographic variables

It includes age, gender, education, life style of work, duration of illness, etc **.**

POPULATION

Population refers to the entire set of individual or objects having some common characteristics -(**Shivani Sharma 2011**)

Target population:

Target population consists of the total number of people or object which are meeting designated set of criteria.-(**Suresh K Sharma 2012**)

The population for the study were the patients with muscle cramps during haemodialysis.

Accessible population:

It is aggregate of cases that confirm the design criteria and are also accessible as subject for the study. (**Suresh K Sharma2013**)

The accessible population for this study were the patients with muscle cramps who met the inclusion and exclusion criteria .

SAMPLE

Sample is a subset of population and selected to participate in a research study .It is a population which represents the entire population.(**Polit and Hungler 2009**)

Sample of the present study are muscle cramps on haemodialysis patients who is admitted in dialysis unit of **Jeyasekharan , Hospital** Kanyakumari.

SAMPLE SIZE

Sample size is normally decided by the nature of the study, nature of population, type of sampling technique, tool, variables, statistical test adopted for data analysis, sensitivity of measures.(**Polit and Beck 2008)**

In this study **sample size is 30** muscle cramps patients on haemodialysis was divided into experimental group (n=15)(who is undergoes intradialytic stretching exercises) and control group (n=15)(who does not undergo intradialytic stretching exercises).

SAMPLING TECHNIQUE

Sampling technique defines the process of selecting a group of people or other elements with which to conduct a study.(**Burns and Groove2002)**

Sampling technique is an important step in the research process. It is the process of selecting representative units or subsets of a population of the study in a research. **Simple random sampling technique- lottery method** was used to select the sample.

SAMPLE SELECTION CRITERIA

Inclusion Criteria:

- Patients who are alert and cooperative.
- Patients with no musculoskeletal impairments.

- Willing to participate in the study.
- Patients with age group of 20-60 years.
- Patients who are able to communicate in Tamil and English.

Exclusion Criteria:

- Patients undergoing emergency haemodialysis
- Patients with femoral catheter
- Patients with any lower limb disability
- Patients who are haemo dynamically unstable during dialysis treatment
- Patient with concurrent medical conditions that may contraindicate exercise
- Patients who are not co-operating during the study

DESCRIPTION OF THE TOOL

SECTION-A

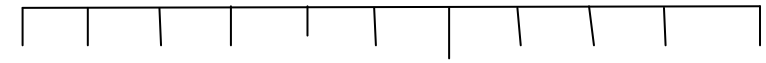
It reveals the information about the demographic variables of haemodialysis patients like age, sex, religion, life style and clinical variables like previous experience of muscle cramps , measures taken to cope up with muscle cramps, frequency of haemodialysis per week, patterns of muscle cramps, duration of haemodialysis, associated medical illness and quality of life.

SECTION B: **Cramp questionnaire chart and numerical intensity pain scale**

This section reveals the characteristics of muscle cramps which included five items - frequency, intensity, quality, intensity of muscle cramps and muscle tone assessment.

(To assess the intensity, modified numerical intensity scale has been used)

Numerical intensity pain scale



0 1 2 3 4 5 6 7 8 9 10

It consists of 10 point numerical intensity scale that was used to assess the intensity of cramps . The scale comprised of a horizontal line with 0- 10 numbers. The score '0' indicates no cramps and the score '10' indicates worst possible cramp. The scale was shown to patients at the end of 2nd, 3r d, 4th hour after the intervention and the results were noted.

Scoring technique: Total score = 20

The questionnaire consisted of 5 questions with respective score for each options. It is categorized as follows.

OPTIONS CRITERIA SCORE

Opinion a	Normal	1
Opinion b	Mild	2

Opinion c	Moderate	3
Opinion d	Severe	4

Characteristics of cramps is differentiated into

Score Interpretation:

S. NO.	ITEMS	SCORE
1	Mild cramps	Below 8
2	Moderate cramps	9-14
3	Severe cramps	15-20

VALIDITY OF THE STUDY

The validity of an instrument is the determination of the extent to which the instrument actually reflect the abstract construct that is being examined.'' Validity addresses the appropriateness, meaningfulness and usefulness of the specific inferences made from instrument scores.(**Burns and Groove 2005).**

The validity of an instrument is based on the adequate coverage of content and judgement of experts on subject matter in the present study.

The entire study was validated by experts .They are nurse specialists, MD Doctors, and statistician.

RELIABILITY

Reliability refers to the degree of consistency or dependability with which an instrument measures the attribute it design to measure. **Polit and Hungler (1999)**

The tool was administered to 6 muscle cramps haemodialysis patients who admitted in JEYASEKHARAN HOSPITAL, Kanyakumari. The tool was implemented other than sample area to check the reliability of tool. The sample was divided into experimental group(n=3),and control group(n=3).

SPEARMAN BROWN'S FORMULA FOR RELIABILITY

$r_1 = 2r/1+ r$

Where r =Correlation co=efficient computed on split half method.

r_1 = The estimated reliability of the entire test.

The tool was found to be reliable(r=0.89)

PILOT STUDY

A small scale version or trail done in preparation for the major study. **Polit and Hungler (1999**).

A formal permission was obtained from Medical officer, Medical superintendent Nursing superintendent, Dialysis specialist, Professor and Head of the Department to conduct the pilot study in Jeyasekharan hospital. Pilot study was conducted on 6 muscle cramps on haemodialysis patients in dialysis unit, N.D. Jeyasekharan hospital. The random sampling technique and inclusion criteria was taken into consideration during sample selection. The sample was divided into

experimental(n=3) and control group (n=3).The duration of study was 10days.After oral consent the investigator collected the information from the samples and the intradialytic stretching exercise was provided to the clients and the effectiveness was seen at the end of fourth hour. The pilot study has helped the investigator to plan the exercise schedule at the end of first hour instead of doing at the end of second hour. It helped to change the study design as post test only control group design. The questionnaire were modified and finalized based upon the experience gained during the pilot study and study was found to be feasible and the findings showed a tendency towards significance.

Data was analysed and findings of the pilot study was showed that in experimental group the mean post score muscle cramps 83.4(SD+ or - 5.74)was greater than the mean pre test score 55.4(SD+ or -5.07).The paired 't' test showed that there is a significant between pre test and post test scores of muscle cramps on haemodialysis patients t=64.89(table value=2.77)at 0.05 level of significant experimental group. The mean post test level of muscle cramps scores in experimental group 83.4was significantly higher than the post test level of muscle cramps score in control group 55(SD+ or - 6.86).Unpaired "t' value was 2.15 which was significant at 0.05 level of significance. The pilot study revealed that the study is feasible and practicable to conduct main study.

DATA COLLECTION PROCEDURE

Data collection is the gathering of information needed to address the research problem. The word "data" means information that is systematically collected in the course of a study.

Data collection is the gathering of information needed to address a research population. **Polit and Hungler (2005)**

The investigator initially established rapport with the patients . The purpose of the study and type of intervention, data collection method were explained to them and written consent was obtained from the patients who are interested and willing to participate. The patients who met the inclusion criteria were selected and randomized. The lottery method was used for sample selection. The samples were numbered and written in slips of paper, shuffled and kept. The slips were taken one after the other and every alternative slips were considered as control and experimental group. Each patients was interviewed to gather clinical profile before the haemodialysis began.

At the end of the first hour, stretching exercise for calf muscle were employed along with the ward routine treatment for experimental group prophylactically ensuring privacy. Initially, the patient was allowed to bend and extend the lower limbs for warming up. The investigator supports the flexed knee joint of the patient and pulls the heel down slowly and flex the foot simultaneously with her inner forearm- till the patient report a feeling of stretch in the calf region. Then release the support of knee joint. Slowly push the knee joint down from the flexed position till it is flat. Maintain the stretch for 30 seconds and slowly released. This was repeated for three times with rest in between. The exercise is employed for both legs. The average time taken for exercise was 10-15minutes.

On the other hand control group received routine management as per the protocols and only their post test assessment was done.

During the next three hours the characteristics of muscle cramps was assessed hourly. The intensity was rated in numbers as figured by the clients on the numerical intensity scale. Frequency, duration, quality and muscle tone assessment were noted each time as described by the patients. The 15 intervention was repeated three times per week for the same patients as a follow up care on alternative days.

Steps of intervention

Intradialytic stretching exercises comprises of

- Ankle dorsiflexion
- Gastrocnemius stretching
- Soleus stretching
- Hamstring stretching
- Quadriceps stretching

DATA ANALYSIS PLAN

Both descriptive and inferential statistics will be used to analyze the data.

Descriptive statistics

1. Frequency and percentage distribution will be used to analyze the demographic data of patients.

2. Mean and standard deviation will be used to assess the outcome measures of numerical pain intensity scale before and after treatment of intradialytic exercises in groups.

Inferential statistics

1. **Paired 't' test** : This test will be used to find the significant differences between the pre-test and post-test level of muscle cramps among patients in both the groups.
2. **Independent 't' test** : This test will be used to assess the significant difference in post-test level of muscle cramps between the experimental and control group.
3. **Chi square test** will be used to find out the association between demographic variable and post test level in experimental group.

SUMMARY

The samples of were selected by using simple random sampling technique 30muscle cramps on haemodialysis patients who were admitted in dialysis unit Jeyasekharan hospital at Kanyakumari, were chosen for the study and they were divided in experimental and control group .A True experimental design post test only control group, was used for the study. Intradialytic stretching exercises was given only to experimental group where control group did not receive treatment. Numerical intensity pain scale was used to assess the muscle cramps of haemodialysis patients before and after treatment with the intradialytic exercises .The data was planned to analyze the by using descriptive statistics and inferential statistics to be presented in the form of table And figures and graphs.

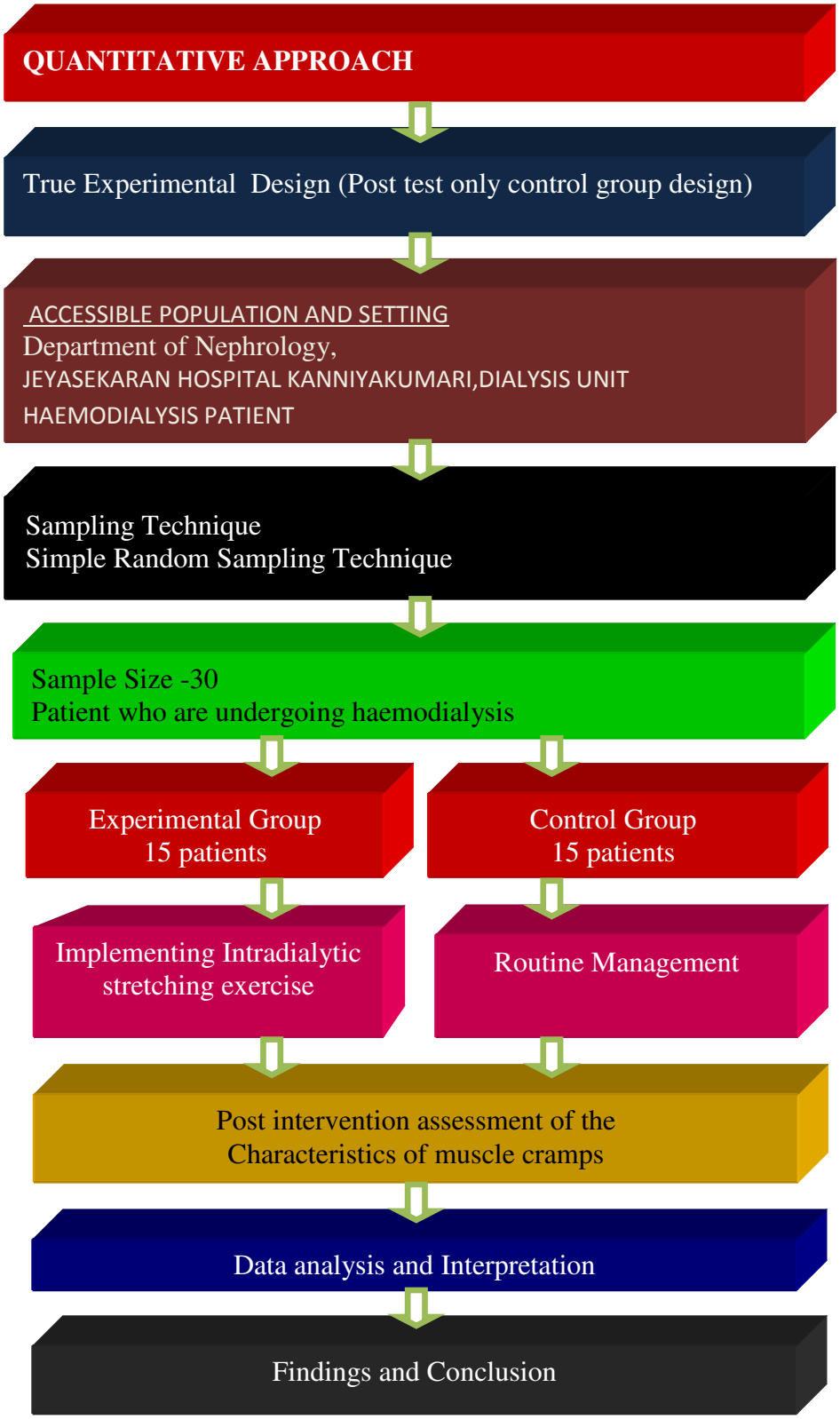


Fig. 3.1: SCHEMATIC REPRESENTATION OF RESEARCH METHODOLOGY

CHAPTER – IV

DATA ANALYSIS AND INTERPRETATION

Analysis is a process of organizing the data in such a way that research question can be answered **(Polit and Hungler, 1999)**. This chapter deals with the analysis of the data collected from the patient and the interpretation of the results helps in making sense of the results of a study. The data was collected to assess the effectiveness of the intradialytic stretching exercises in preventing or reducing the muscle cramps during haemodialysis.

The purpose of analysis is to reduce the data to an interpretable form so that the relation of research can be studied. The data collected from haemodialysis clients with the help of structured interview schedule was organized and analyzed and interpreted by using descriptive and inferential statistics . The data collection was based on the objectives of the study.

THE DATA HAS BEEN ORGANIZED AND PRESENTED IN FIVE SECTIONS:

Section A:

Description of demographic profile in experimental and control group.

Section B:

Assessment of the characteristics of muscle cramps among control group.

Section C:

Assessment of the characteristics of muscle cramps among experimental group after intervention.

Section D:

Compare the post test level of muscle cramps between experimental and control group.

Section E:

Associate the effectiveness of intradialytic stretching exercise with selected demographic variables.

SECTION-A

TABLE-4.1: FREQUENCY AND PERCENTAGE DISTRIBUTION OF PATIENTS DEMOGRAPHIC PROFILE AND CLINICAL PROFILE

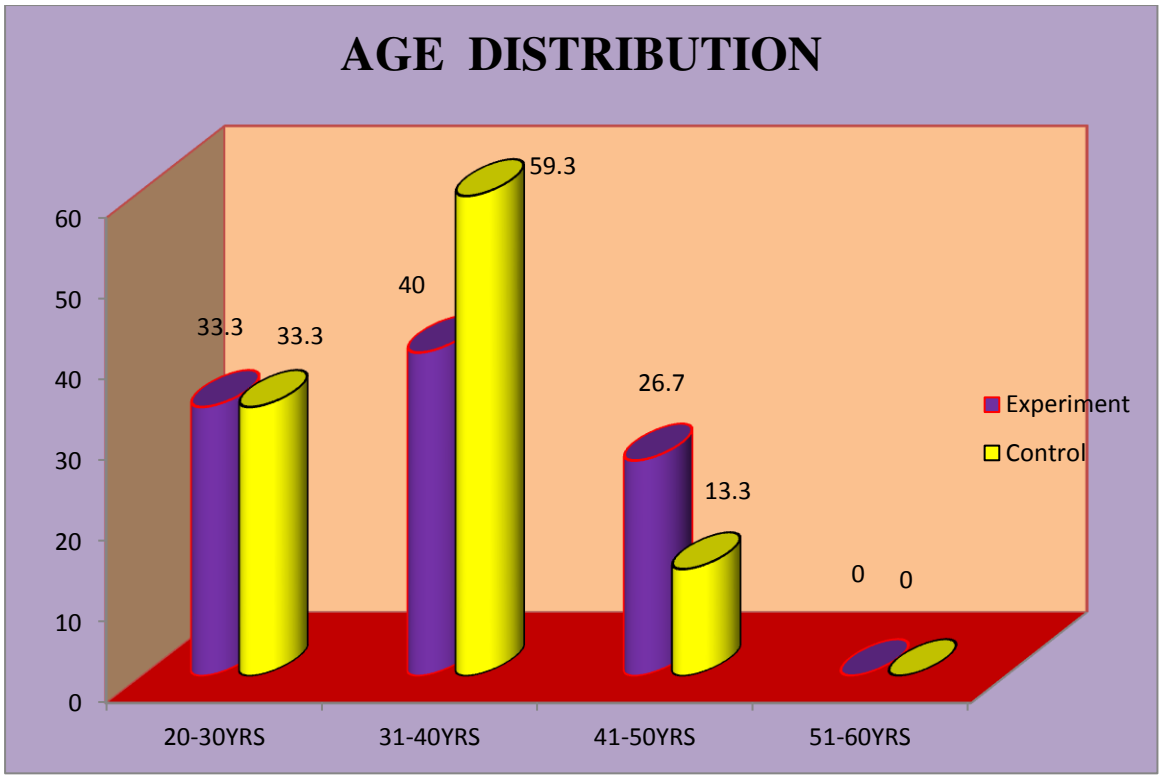
S NO	DEMOGRAPHIC VARIABLES		GROUP			
			Experimental		Control	
			n	%	n	%
1	Age	20-30 years	5	33.3	5	33.3
		31-40 years	6	40	8	59.3
		41-50 years	4	26.7	2	13.3
		51-60 years	0	0	0	0
2	Sex	Male	11	73.3	10	66.7
		Female	4	26.7	5	33.3
3	Religion	Hindu	9	60	6	40
		Christian	6	40	7	46.6
		Muslim	0	0	2	13.3
4	Education	Illiterate	2	13.3	2	13.3
		High school	8	59.3	8	59.3
		Higher secondary	5	33.3	5	33.3
		Graduate	0	0	0	0
5	Duration of illness	0-1 years	8	59.3	2	13.3
		2-3 years	5	33.3	7	46.6
		>3 years	2	13.3	6	40
6	Life style	Active	8	59.3	8	59.3
		Limited activity	6	40	5	33.3
		Sedentary	1	6.7	2	13.3
7	Duration of Haemodialysis	> 3 months	15	100	15	100
		< 3 months	0	0	0	0
8	Previous experience of muscle cramps	Yes	10	66.7	14	93.3
		No	5	33.3	1	6.7

S NO	DEMOGRAPHIC VARIABLES		GROUP			
			Experimental		Control	
			n	%	n	%
9	Patterns of muscle cramps	Constant	3	20	1	6.7
		Intermittent	12	80	14	93.3
10	Frequency of haemodialysis per week	Once	0	0	0	0
		Twice	12	80	12	80
		Thrice	3	20	3	20
11	When do you experience the muscle cramps during haemodialysis?	First hour	0	0	0	0
		Middle hour	2	13.3	3	30
		Last hour	13	86.7	12	80
12	Measures taken to cope with muscle cramps	Walking	1	6.7	0	0
		Distraction	4	26.7	3	20
		Massaging	6	40	8	53.3
		Hot/Cold Application	0	0	0	0
		Medications	4	26.7	4	26.7
		Others	0	0	0	0

The above table shows that demographic characteristics of 30 patients who participated in the study were described in terms of frequency percentage. Among **6 (40%)**in experimental group and 8 (59.3%) in control group were in the age group of 31-40 years and **11(73.3%)**male in experimental group and **10(66.7%)**male in control group, and **4(26.7%)**female in experimental group and **5(33.3%)**female in control group . In both group **15(100%)** of the clients undergoing above 3months in duration of haemodialysis.Nearly**10(66.7%)** of the clients had Previous experience of muscle cramps in experimental group and **14(93.3%)** the clients had Previous

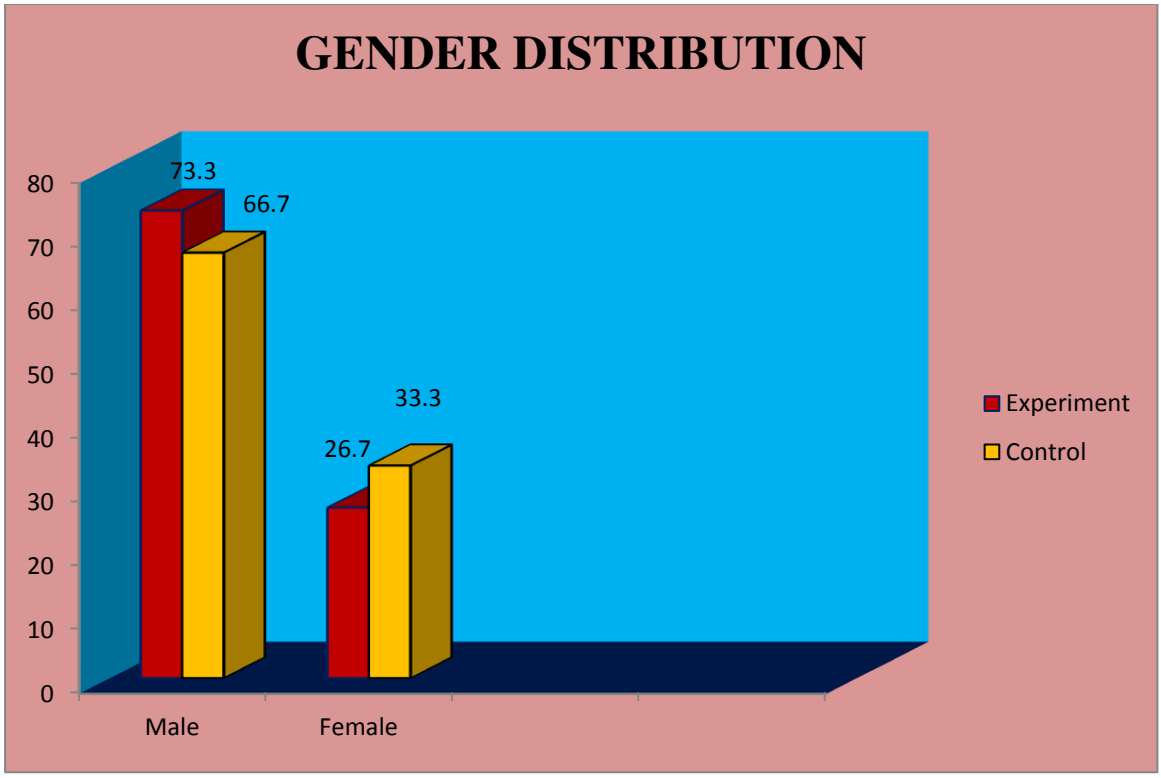
experience of muscle cramps in control group. In both group**14(93.3%)** of the clients in control groups, and **12(80%)** in experimental group client were having intermittent muscle cramps throughout the haemodialysis session. Nearly **13(86.7%)** of the clients had muscle cramps last hour in experimental group, **12(80%)** of the clients had muscle cramps in control group. Nearly **6(40%)** were taking massage in muscle cramps in experimental group and **8(53.3%)**were taking massage in muscle cramps in control group.

Figure 4.1: Distribution of patients with regard to age



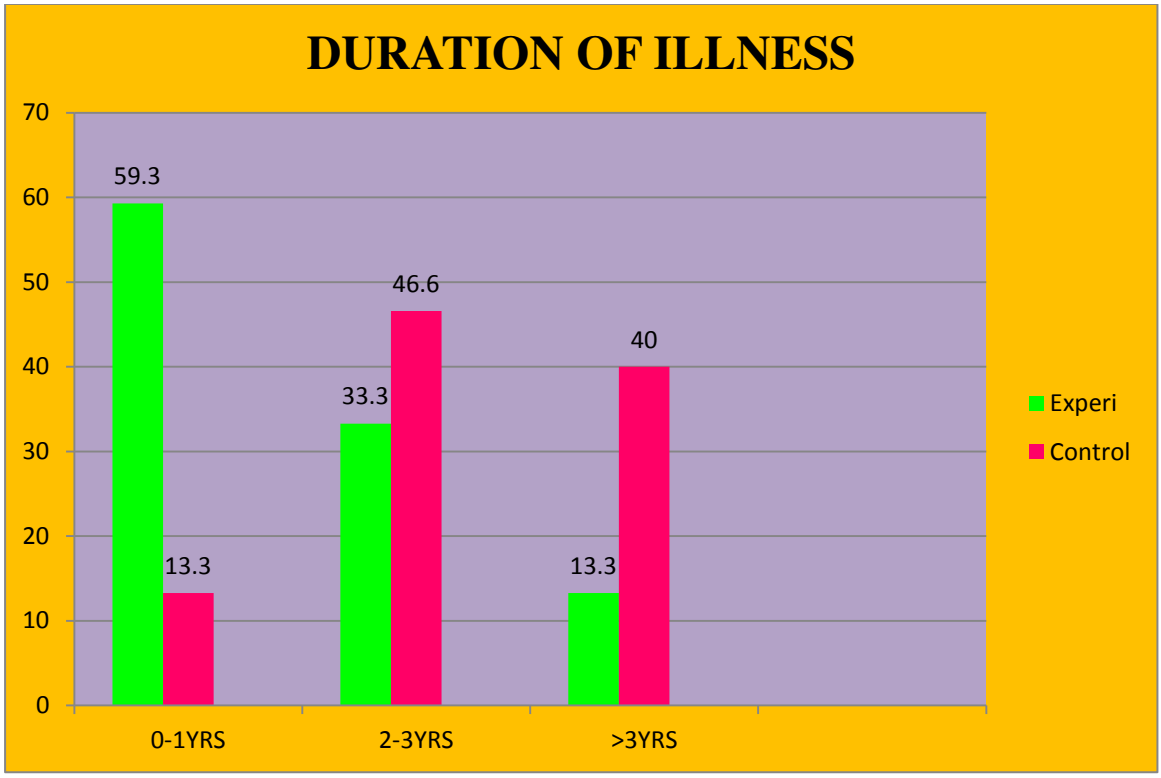
Cylinder diagram showing that majority of the patients undergoing haemodialysis were in the age group of 31-40 years in experiment al group 6 (40%) and control group 8(59.3%).

Figure 4.2: Distribution of patients with regard to sex



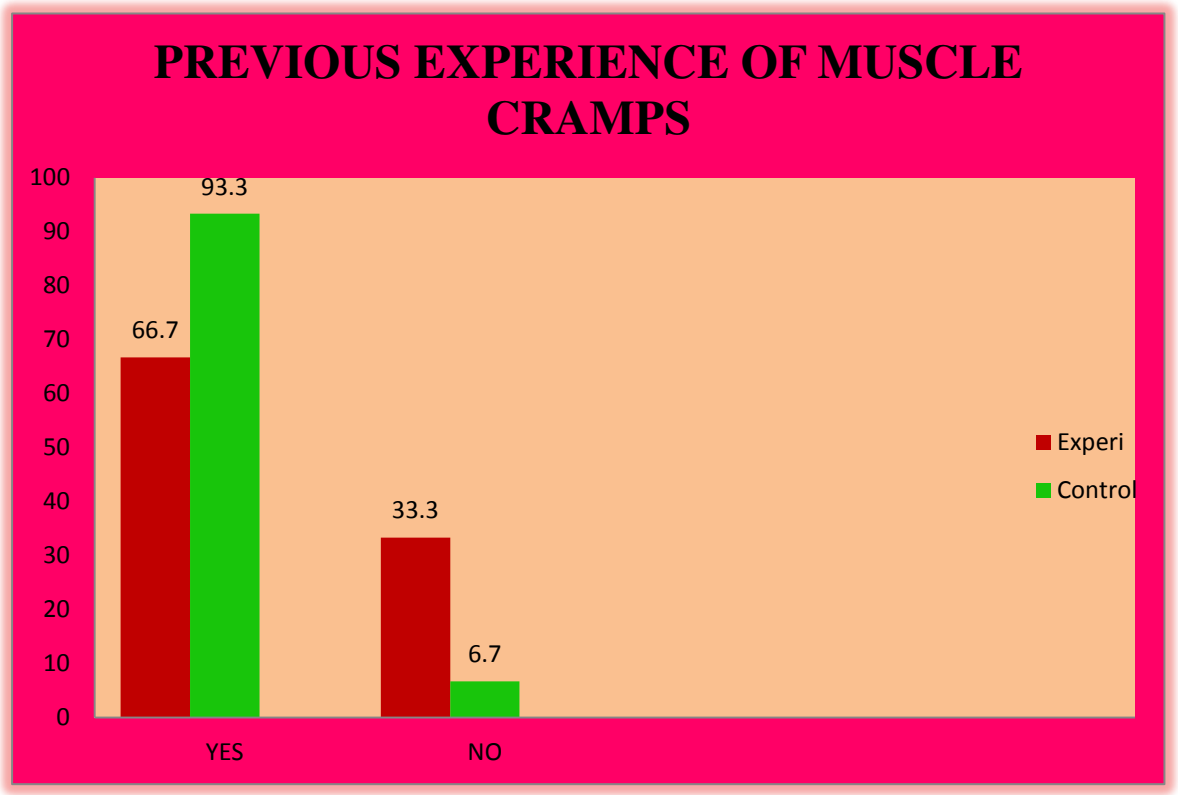
Bar diagram showing percentage distribution of the patients undergoing haemodialysis according to Sex.

Figure 4.3: Distribution of patients with regard to duration of illness



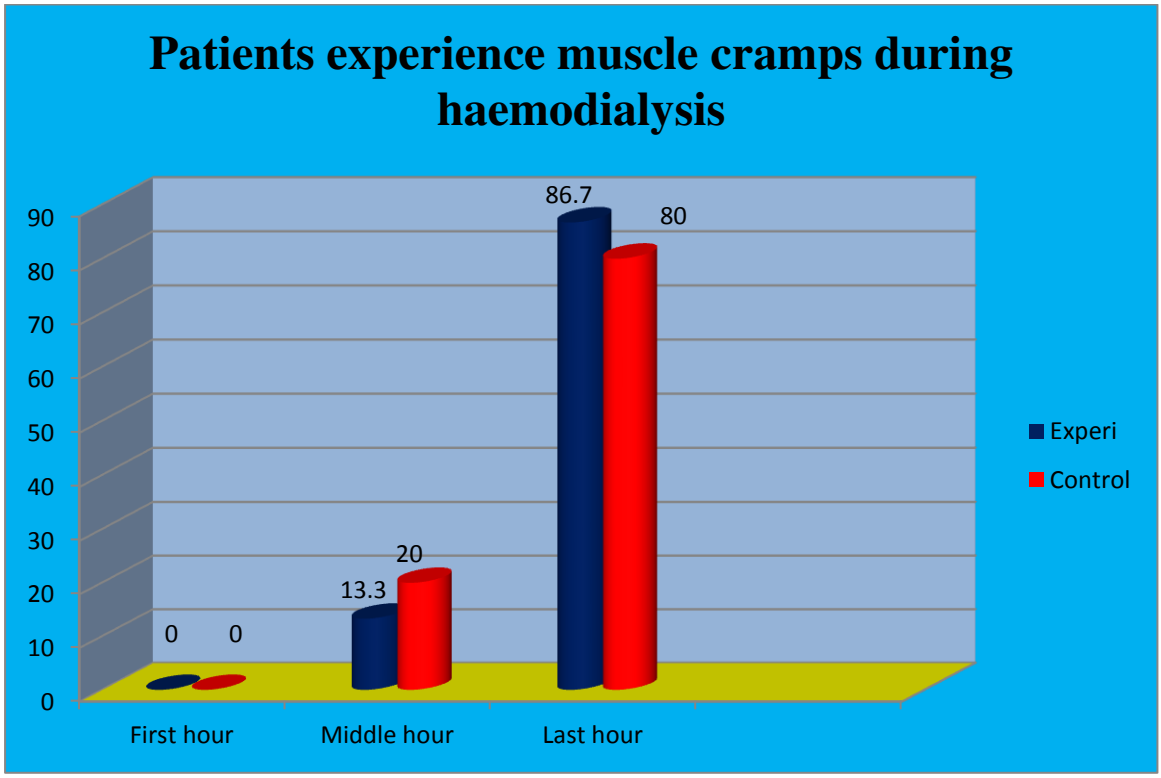
Bar diagram showing percentage distribution of the patients undergoing haemodialysis according to duration of illness.

Figure 4.4: Distribution of patients with regard to previous experience of muscle cramp



Bar diagram showing percentage distribution of the patients undergoing haemodialysis according to previous experience of muscle cramps.

Figure 4.5:Distribution of patients with regards to when experiencing muscle cramps during haemodialysis



Cylinder diagram showing percentage distribution of the patients undergoing haemodialysis according to when the experience muscle cramps during haemodialysis.

SECTION –B

TABLE- 4.2: LEVEL OF MUSCLE CRAMPS IN CONTROL GROUP

Day	Time duration	Level of muscle cramps	Control group	
			n=15	%
Day 1	2hrs	Mild	15	100
		Moderate	0	0
		Severe	0	0
	3hrs	Mild	12	80
		Moderate	3	20
		Severe	0	0
	4hrs	Mild	0	0
		Moderate	7	47
		Severe	8	53
Day2	2hours	Mild	15	100
		Moderate	0	0
		Severe	0	0
	3hours	Mild	0	0
		Moderate	15	100
		Severe	0	0
	4hours	Mild	0	0
		Moderate	14	93.3
		Severe	1	6.7
Day3	2hours	Mild	8	53.3
		Moderate	7	46.7
		Severe	0	0
	3hours	Mild	0	0
		Moderate	14	93.3
		Severe	1	6.7
	4hours	Mild	0	0
		Moderate	8	53.3
		Severe	7	46.7

The table describes that, on day one 15(100%) of the patient had mild muscle cramps respectively. On day three at the end of fourth hour 8(53.3%) of them had moderate cramps and 7(46.7%) had severe cramps and no one had evidenced mild muscle cramps.

SECTION – C

TABLE- 4.3: LEVEL OF MUSCLE CRAMPS AFTER INTRADIALYTIC STRETCHING EXERCISE IN EXPERIMENTAL GROUP

Day	Time duration	Level of muscle cramps	Experimental group	
			n=15	%
Day 1	2hrs	Mild	15	100
		Moderate	0	0
		Severe	0	0
	3hrs	Mild	14	93.3
		Moderate	1	6.7
		Severe	0	0
	4hrs	Mild	14	93.3
		Moderate	1	6.7
		Severe	0	0
Day2	2hours	Mild	14	93.3
		Moderate	1	6.7
		Severe	0	0
	3hours	Mild	13	86.7
		Moderate	2	13.3
		Severe	0	0
	4hours	Mild	14	93.3
		Moderate	1	6.7
		Severe	0	0
Day3	2hours	Mild	14	93.3
		Moderate	1	6.7
		Severe	0	0
	3hours	Mild	13	86.7
		Moderate	2	13.3
		Severe	0	0
	4hours	Mild	14	93.3
		Moderate	1	6.7
		Severe	0	0

The table describes that ,on day one 14(93.3%) of the patient had mild and 1(6.7%)of the patient had moderate muscle cramps respectively. On day three at the end of fourth hour 14(93.3%) of them had mild cramps and 1(6.7%) had moderate cramps and no one had evidenced severe muscle cramps.

SECTION D

TABLE-4.4:DAY WISE AND HOUR WISE CHARACTERISTICS OF MUSCLES CRAMPS AFTER THE INTERVENTION

Day	Time duration	Level of muscle cramps	Group				Pearson chi -square test
			Experimental		Control		
			n	%	n	%	
Day 1	2hrs	Mild	15	100	8	53.3	$\chi 2$= 9.12 P=3.84 DF=1
		Moderate	0	0	7	46.7	
		Severe	0	0	0	0	
	3hrs	Mild	14	93.3	2	13.3	$\chi 2$= 19.2 P=3.84 DF=1
		Moderate	1	6.7	13	86.7	
		Severe	0	0	0	0	
	4hrs	Mild	14	93.3	0	0	$\chi 2$= 26.2 P=5.99 DF=2
		Moderate	1	6.7	13	86.7	
		Severe	0	0	2	13.3	
Day2	2hours	Mild	14	93.3	7	46.7	$\chi 2$= 7.72 P=3.84 DF=1
		Moderate	1	6.7	8	53.3	
		Severe	0	0	0	0	
	3hours	Mild	13	86.7	2	13.3	$\chi 2$= 16.2 P =5.99 DF=2
		Moderate	2	13.3	11	73.4	
		Severe	0	0	2	13.3	
	4hours	Mild	14	93.3	0	0	$\chi 2$= 26.4 P=5.99 DF=2
		Moderate	1	6.7	11	73.3	
		Severe	0	0	4	26.6	
Day3	2hours	Mild	14	93.3	1	6.7	$\chi 2$= 22.6 P=5.99 DF=2
		Moderate	1	6.7	9	60	
		Severe	0	0	5	33.3	
	3hours	Mild	13	86.7	0	0	$\chi 2$= 23.2 P=5.99 DF=2
		Moderate	2	13.3	10	66.7	
		Severe	0	0	5	33.3	
	4hours	Mild	14	93.3	0	0	$\chi 2$= 26.4 P=5.99 DF=2
		Moderate	1	6.7	6	40	
		Severe	0	0	9	60	

* significant at P≤0.05

The table shows that the level of muscle cramps after intervention progressively reduced from severe to mild in third and fourth hour from day one to day three in experimental group which is statistically significant at 0.05%level.

TABLE-4.5 : COMPARISON OF MEAN MUSCLE CRAMPS SCORE

Day	HOURS	Experiment		Control		Un paired 't' TEST		
		Mean	SD	Mean	SD			
Day1	4hours	1.28	1.07	1.46	0.9	t=4	P=0.05%	DF=28
	3hours	1.26	0.94	1.95	0.9	t=16.6	P=0.05%	DF=28
	2hours	4.2	3.01	6.46	3.34	t=15	P=0.05%	DF=28
Day2	4hours	1.46	1.07	2.2	2.03	t=39	P=0.001%	DF=28
	3hours	2.73	2.6	3.1	2.3	t=18	P=0.05%	DF=28
	2hours	3.0	2.4	4.1	1.6	t=29.6	P=0.001%	DF=28
Day3	4hours	2.53	2.6	3.1	2.3	t=17.6	P=0.05%	DF=28
	3hours	2.67	3.16	5.2	2.9	t=35.2	P=0.001%	DF=28
	2hours	3.12	3.1	8.04	4.0	t=34.6	P=0.001%	DF=28

* significant at P≤0.05

The table shows the comparison of mean muscle cramps score between experimental and control group in first day. The mean score of 2hours in experimental group is 4.2 and standard deviation is 3.01 and in control group the mean score is 6.46 and fourth hours mean of experimental group is 1.28 and standard deviation is 1.07and whereas control group is 1.46 and standard deviation is 0.9 .The day wise mean and standard deviation in experimental group is reduced while comparing to control ,it is statistically significance from day one to day three. Statistical significance was calculated using students independent t-test.

TABLE-4.6: EFFECTIVENESS OF INTRADIALYTIC STRETCHING EXERCISESCORE

DAY ONE HEMODIALYSIS II,III,IV HOURS

Day	Hours	Min-Max score	Experiment	Control	Difference in percentage
			Mean score %	Mean score %	
Day 1	4hours	5-20	6.4%	7.3%	0.9%
	3hours	5-20	6.3%	9.75%	3.45%
	2hours	5-20	21%	32.3%	11.3%

DAY TWO HEMODIALYSIS II,III,IV HOURS

Day 2	4hours	5-20	7.3	10.15%	2.85%
	3hours	5-20	13.35	15.5%	2.15%
	2hours	5-20	16.5%	22%	5.5%

DAY THREE HEMODIALYSIS II,III,IV HOURS

Day 3	4hours	5-20	13.65%	15.5%	1.85%
	3hours	5-20	13.35%	26%	12.65%
	2hours	5-20	15.6%	40.2%	24.6%

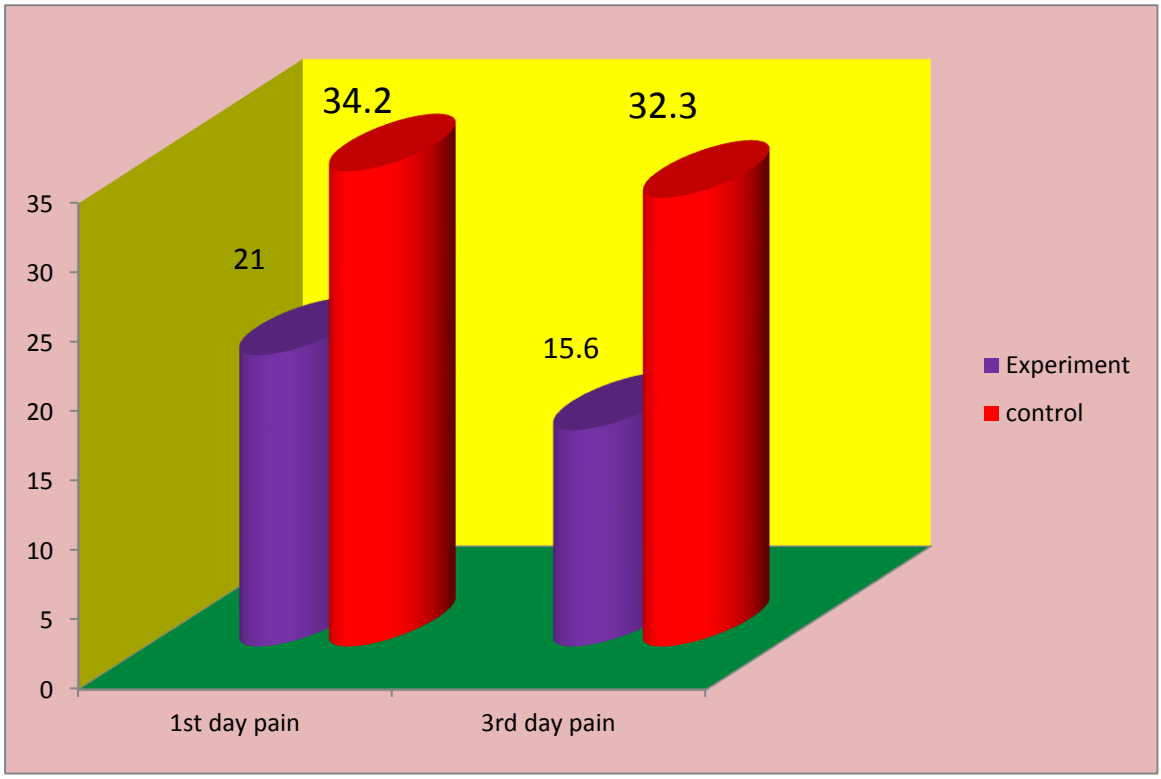
The table shows day wise and hour wise characteristics of muscles cramps. Initially experiment group patients have 21% score at first day in 2hours of muscle cramps and control group patients have 32.3% score at first day in 2hours of muscle cramps after three days in experiment group patients have15.6%score in 2 hours of muscle cramps and control group patients have 40.2%score of muscle cramps and difference in mean percentage score is 24.6%. Each day and each hour assessment shows experiment group patients are having more reduction than control group patients.

TABLE-4.7 : OVERALL EFFECTIVENESS OF INTRADIALYTIC STRETCHING EXERCISE

	Max Score	**Baseline Pain Score percentage**	**Day3 Pain Score percentage**	**Mean percentage Difference in cramps score**
Experiment	20	21%	15.6%	5.4%
Control	20	34.2%	32.3%	1.9%

This table shows the effectiveness of exercise (5.4%) in experiment group, whereas in control group it is only 1.9%. Experiment group benefited more than control group (5.4 – 1.9= 3.5%). This is the net effect of the study.

FIG. 4.6: Overall effectiveness of intradialytic stretching



Cylinder diagram showing mean percentage distribution of the patients undergoing haemodialysis according to overall effectiveness of intradialytic stretching exercise day 1-day 3

SECTION – E

TABLE-4.8: ASSOCIATION BETWEEN POST TEST LEVEL OF MUSCLES CRAMPS AND DEMOGRAPHIC VARIABLE (Experiment group)

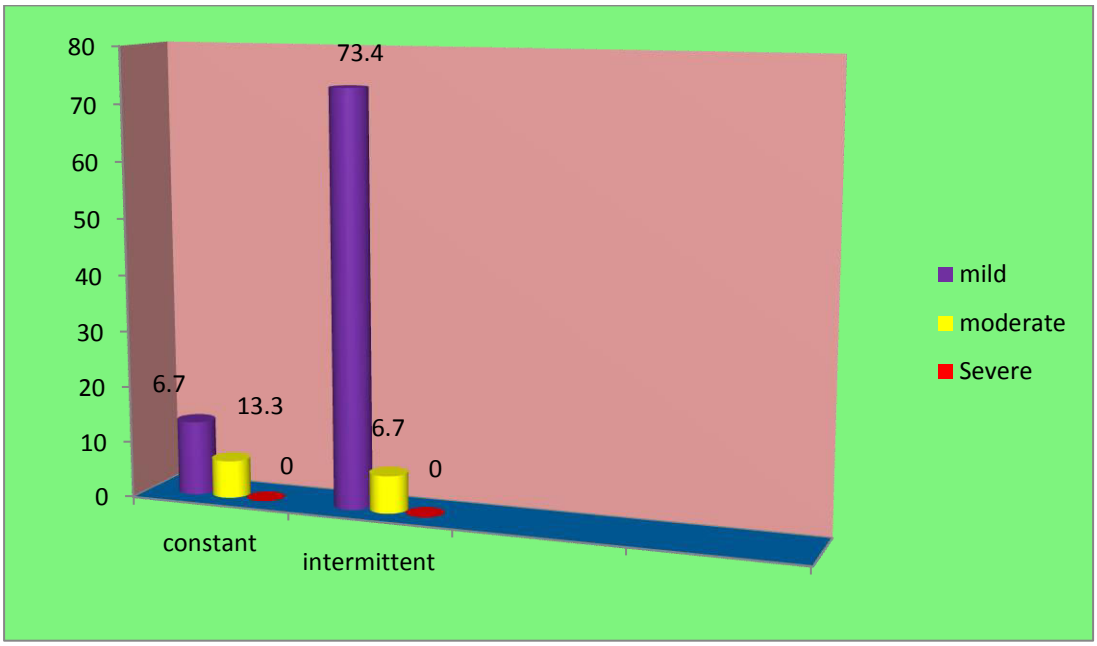
Demographic variables		Level of Muscles cramps score						Chi-square	Table value	P value
		Mild		Moderate		Severe				
		N	%	N	%	n	%			
Age	20 - 30 year	5	33.3	0	0	0	0	$\chi2$= 3.98	t=9.0	P=0.05 % DF=6NS
	31- 40 years	5	33.3	1	6.7	0	0			
	41 - 50 years	4	26.6	0	0	0	0			
	51 – 60 years	0	0	0	0	0	0			
Sex	Male	6	40	5	33.3	0	0	$\chi2$= 0	t=3.84	P=0.05 % DF=1NS
	Female	2	13.3	2	13.3	0	0			
Religion	Hindu	7	46.7	1	6.7	0	0	$\chi2$= 1.12	t=3.84	P=0.05 % DF=2 NS
	Christian	5	33.3	2	13.3	0	0			
	Muslim	0	0	0	0	0	0			
Education	Illiterate	1	6.7	1	6.7	0	0	$\chi2$= 3.094	t=7.82	P=0.05 % DF=3 NS
	High school	7	46.7	1	6.7	0	0			
	Higher secondary	5	33.3	0	0	0	0			
	Graduate	0	0	0	0	0	0			
Duration of illness	0-1 years	7	46.7	1	6.7	0	0	$\chi2$= 1.14	t=5.99	P=0.05 % DF=2 NS
	2-3 years	5	33.3	0	0	0	0			
	> 3 years	2	13.3	0	0	0	0			
Life style	Active	7	46.7	1	6.7	0	0	$\chi2$= 0.50	t=5.99	P=0.05 % DF=2 NS
	Limited activity	5	33.3	1	6.7	0	0			
	Sedentary	1	6.7	0	0	0	0			
Duration of haemodialysis	> 3 months	8	53.3	7	46.7	0	0	$\chi2$=0	t=3.94	P=0.05 % DF=2 NS
	< 3 months	0	0	0	0	0	0			
Previous experience ofmuscle cramps	Yes	9	60	1	6.7	0	0	$\chi2$= 6.80	t=3.84	P=0.05 % DF=1 S
	No	5	33.3	0	0	0	0			
Patterns of muscle cramps	Constant	2	13.3	1	6.7	0	0	$\chi2$= 1.28	t=3.84	P=0.05 % DF=1
	Intermittent	11	73.4	1	6.7	0	0			

										NS
Frequency of haemodialysis per week	Once	0	0	0	0	0	0	χ^2= 4.63	t=3.84	P=0.05 % DF=1 S
	Twice	11	73.4	1	6.7	0	0			
	Thrice	2	13.3	1	6.7	0	0	χ^2= 2.33	t=5.99	P=0.05 % DF=2 NS
When do you experience the muscle cramps during haemodialysis	First hour	1	6.7	0	0	0	0	χ^2= 2.45	t=5.99	P=0.05 % DF=2 NS
	Middle hour	11	73.4	1	6.7	0	0			
	Last hour	1	6.7	1	6.7	0	0			
Measures taken to cope with muscle cramps	Walking	1	6.7	0	0	0	0	χ^2= 10.01	t=5.99	P=0.05 % DF=2 NS
	Distraction	3	20	1	6.7	0	0			
	Massaging	5	33.3	0	0	0	0			
	Hot / Cold application	0	0	0	0	0	0			
	Medications	4	26.6	1	6.7	0	0			
	Others	0	0	0	0	0	0			

* significant at P≤0.05

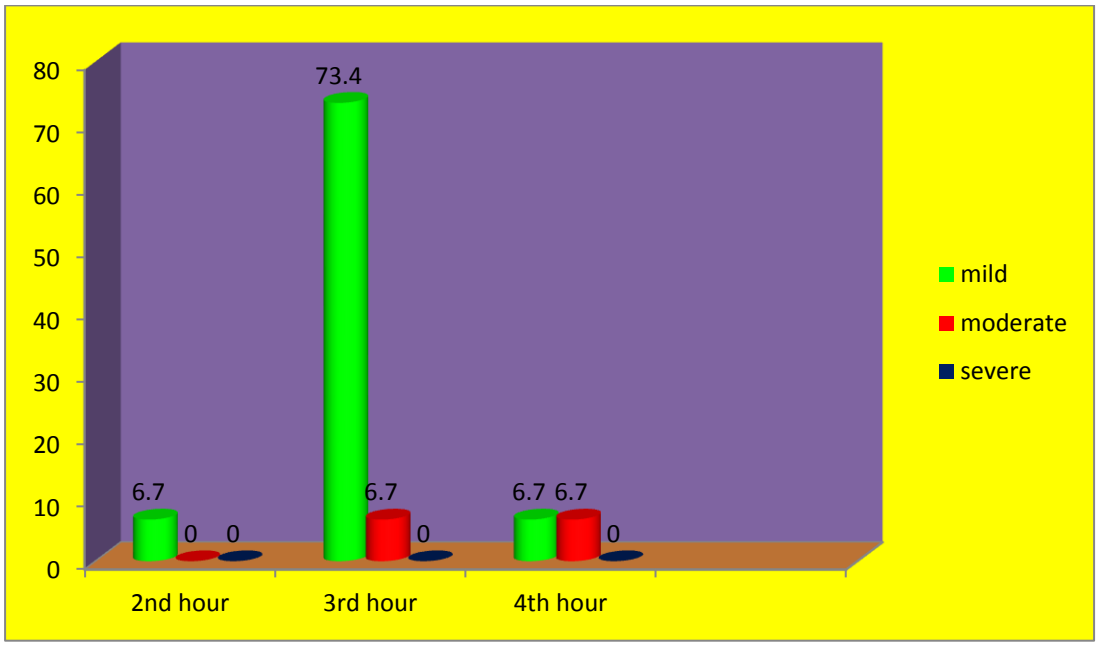
The table shows the association between demographic variables and their level of muscles cramps score. Previous experience of muscle cramps shows significant and frequency of haemodialysis per week of muscle cramps shows significant. Statistical significance was analyzed using Pearson chi-square test .

Figure 4.7 : Association between post test level of muscle cramps pattern of muscle cramps



Cylinder diagram showing association between post test level of muscle cramps and pattern of muscle cramps

Figure 4.8: Association between post test level of muscle cramps and when experience muscle cramps



Cylinder diagram showing association between post test level of muscle cramps and when experiencing muscle cramps

CHAPTER – V

DISCUSSION

This chapter deals with the discussion of results of the data analyzed based on the objectives of the study. The purpose of the study is to assess the effectiveness of intradialytic stretching exercise on muscle cramps among patients undergoing haemodialysis.

The Jeyasekharan Hospital is one of the oldest and biggest hospital in Kanyakumari District, Tamil Nadu, patients were undergoing haemodialysis in Department of Nephrology daily.

Muscle cramps is a common and clinically important problem which occurs during haemodialysis. 30 patients between age group of 31-40 years who are undergoing haemodialysis treatment regularly in Nephrology ward were selected by simple random sampling technique and assigned to experimental (15) and control group (15) on the basis of inclusion criteria.

CHARECTERISTICS OF DEMOGRAPHIC VARIABLES

The demographic characteristics of 30 patients who participated in the study were described in terms of frequency percentage. Among **6 (40%)**in experimental group and 8 (59.3%) in control group were in the age group of **31-40 years** and **11(73.3%)**male in experimental group and **10(66.7%)** male in control group, and **4(26.7%)**female in experimental group and **5(33.3%)** female in control group . In both group **15(100%)** of the clients undergoing above 3months in duration of

hamodialysis.Nearly**10(66.7%)** of the clients had Previous experience of muscle cramps in experimental group and **14(93.3%)** the patients had Previous experience of muscle cramps in control group. In both group **14(93.3%)** of the patients in control groups, and **12(80%)** in experimental group patients were having intermittent muscle cramps throughout the haemodialysis session. Nearly **13(86.7%)** of the patients had muscle cramps last hour in experimental group, **12(80%)** of the patients had muscle cramps in control group. Nearly **6(40%)** were taking massage in muscle cramps in experimental group and **8(53.3%)**were taking massage in muscle cramps in control group.

DISCUSSION OF THE STUDY BASED ON THE OBJECTIVES

The first objective is to assess the characteristics of muscle cramps among control group.

The semi structured questionnaire was used to assess the characteristics of muscle cramps. The control group patients received routine management for muscle cramps. Some of the treatment include administration of medications, intravenous fluids like dextrose, normal saline etc. The characteristics of muscle cramps are assessed from first hour till the end of dialysis treatment and noted the frequency, intensity, quality, intensity of muscle cramps and the muscle tone assessment. It is evident that, after assessing the day wise assessment of muscle cramps in the control group, day one 14(93.3%) of the patient had mild and 1(6.7%)of the patient had moderate muscle cramps respectively. On day three at the end of fourth hour 14(93.3%) of them had mild cramps and 1(6.7%) had moderate cramps and no one had evidenced severe muscle cramps.

This implies that most of the patients perceive muscle cramps persistently throughout the haemodialysis session.

The three conditions that seem to increase cramping are hypotension, the patient being below dry weight and us e of low sodium dialysis solution. The severe muscle cramping experienced near the end of the dialysis treatment and persisting for a time after dialysis oft en is due to dehydration.

The second objective was to assess the characteristics of muscle cramps among the experimental group after intervention

It represents the characteristics of muscle cramps in the experimental group. It is evident that , after assessing the day wise assessment of muscle cramps in the experimental group, day one 14(93.3%) of the patient had mild and 1(6.7%)of the patient had moderate muscle cramps respectively. On day three at the end of fourth hour 14(93.3%) of them had mild cramps and 1(6.7%) had moderate cramps and no one had evidenced severe muscle cramps.

The mean score of muscle cramps after intradialytic - stretching exercise on day one is Initially experiment group patients have 21% score at first day in 2hours of muscle cramps and control group patients have 32.3% score at first day in 2hours of muscle cramps after three days in experiment group patients have15.6%score in forth hours of muscle cramps and control group patients have 40.2%score of muscle cramps muscle cramps pain reduction difference in percentage at third day 24.6%. Overall the effectiveness of intervention is reduction of muscle cramps between experimental and control group is 5.4%. Each day and each hour assessment shows experiment group patients are having more reduction than control group

patients.The patients those who received intervention reported reduced frequency, duration, intensity, quality of muscle cramps. This may be due to the significant influence of intradialytic stretching exercise on muscle cramps.

The third objective is to evaluate the effectiveness of intradialytic stretching exercise on muscle cramps among experimental group.

The effectiveness of exercise was summarized in table 7 and 8. Intradialytic exercise programs are important to enhance patient's physical functioning, exercise capacity, and improve overall health. The research on exercise and dialysis clearly shows a positive benefit for patients with End Stage Renal Disease. Initially experiment group, patients had mean score of6.4% score at first day in 2hours of muscle cramps and control group patients have7.3% score at first day in 2hoursof muscle cramps after three days in experiment group patients had 15.6%score in forth hours of muscle cramps and control group patients had 40.2%score of muscle cramps. Whereas in control group patients initially they have 7.3% score. Each day and each hour assessment shows experiment group patients are having more reduction than control group patients.

The level of muscle cramps after intervention progressively reduced from severe to mild in the third and fourth hour from day one today three in the experimental group which is statistically significant. This shows that intradialytic stretching exercise will reduce the frequency, duration, quality, intensity and muscle tone.

The fourth objective is to associate the effectiveness of intradialytic stretching exercise with selected demographic variables

The table 9 shows the association between demographic variables and the level of muscles cramps score. More previous experience of muscle cramps, duration of haemodialysis of muscle cramps and less duration of dialysis are the significant factors. The Statistical significance was analyzed using Pearson chi square test. There is a statistically significant association between demographic variables the level of muscles cramps score. There is a strong association (P=0.05) between previous experience of muscle cramps and level of muscle cramps. There is a strong association (P=0.05) between duration of haemodialysis and level of muscle cramps. The patients who experienced cramps constantly throughout the procedure experiences moderate level of cramps. On the other hand, patients with intermittent cramps throughout the haemodialysis cycle experienced only mild cramps.

There is a strong association (P=0.05) between duration of haemodialysis and level of muscle cramps. The patients who are under treatment for less than three months experiences muscle cramps more than the patients with duration of treatment for more than three months. The acute renal failure patients are more prone for muscle cramps than those with chronic renal failure.

Treatment for cramping vary from unit to unit. When patients are having cramping and have low blood pressure, the staff may give normal saline. This will increase the fluid in the body and muscle cramping may be relieved to some extent. In addition, hypertonic saline or glucose may be given. Heat and massage for the cramping muscle can ease the pain. For chronic leg cramps they may prescribe

Quinine, Carnitine, or another medication. A formal intradialytic exercise regimen can produce objective evidence of improvement in physical performance of the patients. Intradialytic progressive strength training was safe and effective among maintenance dialysis patients. Thus, the investigator had tried a program of gentle stretching and toning exercises targeted at the muscles which may tend to cramp during dialysis. Intradialytic exercise programs are important to enhance patient physical functioning, exercise capacity, and improve overall health. This should become a standard of treatment for all dialysis units. Although having an exercise professional to run the program would be ideal, with the available resources to the dialysis community, an exercise program could become a reality managed solely by the dialysis staff. These findings suggested that the exercise was effective in terms of reduction in the frequency, intensity, duration, quality and muscle tone in the experiment al group. The nurse must be alert to spend time to assess risk factors for muscle cramps and develop nursing strategies to prevent or reduce the incidence of muscle cramps during haemodialysis.

CHAPTER – VI

SUMMARY, CONCLUSION, IMPLICATION, RECOMMENDATIONS AND LIMITATIONS

This chapter deals with the summary of the study and conclusion drawn. It focuses on the implications and given recommendations for nursing practices , nursing research, nursing administration, nursing education and limit at ions of the study.

SUMMARY OF THE STUDY

The focus of the study was to assess the effectiveness of intradialytic stretching exercise on muscle cramps among patients undergoing haemodialysis at Dialysis unit, Jeyasekharan Hospital. Kanyakumari.

The design of the study was **True experimental – post test only control group** design. A total number of 30 clients who are undergoing haemodialysis were selected for this study and selected them according to the inclusion criteria. A semi structured questionnaire was used to assess the characteristics of muscle cramps.

This study was carried out with the following objectives

- To assess the characteristics of muscle cramps among control group
- To assess the characteristics of muscle cramps among experimental group after intervention

- To evaluate the effectiveness of intradialytic stretching exercises on muscle cramps among experiment al group

- To associate the effectiveness of intradialytic stretching exercise with selected demographic variables

The study was based on the assumption that

- Patient receiving intradialytic stretching exercise will experience less muscle cramps.

- Stretching exercises improves perfusion

The following hypotheses were set for the study and all hypotheses were tested at 0.05% of significance level.

Patient receiving intradialytic stretching exercise will experience less muscle cramps during dialysis than those who are not.

Intradialytic stretching exercise will reduce the frequency, duration, quality, intensity and muscle tone assessment.

The variables of the study were

Independent variable: Intradialytic stretching exercise

Dependent variable: Muscle cramps

The review of literature was done from primary and secondary sources that formed the bas is of review related to muscle cramps and related to the effectiveness

of physical exercises while undergoing haemodialysis. The conceptual framework adopted for this study was Betterlenberg General system Theory.

The study setting was Dialysis unit, Department of Nephrology, Jeyasekharan Hospital, Kanyakumari. After testing the validity and reliability, the same tool was used for the data collection.

The pilot study was conducted after getting formal approval was obtained from the Professor and Head of the Department, Department of Nephrology . After obtaining informed consent from the patients the investigator conducted the pilot study by selecting 10 samples by using simple random sampling method. The investigator collected the information from the samples and the intradialytic stretching exercise was provided to the clients and the effectiveness was seen at the end of fourth hour. The result revealed that the intervention reduces the frequency, intensity, duration, quality and muscle tone.

The main study was conducted at the Dialysis unit, Department of Nephrology among 30 patients who are undergoing haemodialysis session routinely. The data was collected and analyzed using descriptive and inferential statistics.

MAJOR FINDINGS OF THE STUDY

The results showed that there was a significant difference between experimental and control group. The experimental group, day one 14(93.3%) of the patient had mild and 1(6.7%)of the patient had moderate muscle cramps respectively. On day three at the end of fourth hour 14(93.3%) of them had mild

cramps and 1(6.7%) had moderate cramps and no one had evidenced severe muscle cramps.

The mean score of muscle cramps after intradialytic - stretching exercise on day one is Initially experiment group patients have 21% score at first day in 2hours of muscle cramps and control group patients have 34.3% score at first day in 2hours of muscle cramps after three days in experiment group patients have15.6%score in forth hours of muscle cramps and control group patients have 40.2%score of muscle cramps . Each day and each hour assessment shows experiment group patients are having more reduction than control group patients.The patients those who received intervention reported reduced frequency, duration, intensity, quality of muscle cramps. This may be due to the significant influence of intradialytic stretching exercise on muscle cramps.

The mean and standard deviation of muscle cramp score in experimental group is found to be significant (P=0.05) from day two. The statistical significance was calculated using independent t-test.

Over all study shows that intradialytic stretching exercise will reduce the frequency, duration, quality, intensity and muscle tone. This shows that there is an association that the patient receiving intradialytic stretching exercise will experience less muscle cramps.

There is a statistically significant association between previous experience of muscle cramps and level of muscle cramps(P=0.05) and frequency of haemodialysis (P=0.05) respectively.

CONCLUSION

The present study assessed the effectiveness of intradialytic stretching exercise among patients undergoing haemodialysis. The results revealed that intradialytic stretching exercise can be effectively used to reduce the frequency, duration, quality, intensity and muscle tone of the patients who are undergoing haemodialysis. This intervention given during the haemodialysis session is simple and effective method to treat muscle cramps prophylactically. Intradialytic stretching exercise can be added as an adjunct treatment for dialysis patients. Therefore the nurse working in haemodialysis unit should encourage the patients to do the simple exercise during the haemodialysis.

IMPLICATIONS

The investigator had drawn the following implications for the study, which are necessary in the field of nursing practice, nursing administration, nursing education, nursing research.

Nursing Practice

Nurses have a vital role in caring patients who undergo haemodialysis. By doing this intradialytic stretching exercise as a routine care during the cycle will reduce the occurrence of muscle cramps This can be followed as a routine care during the haemodialysis cycle. It has to establish as a evidence based nursing practice.

Nursing Education

As nursing educator, we must strengthen the evidence based nursing practices among the undergraduate and post graduate nursing students .The nursing education curriculum must provide adequate clinical exposure of students in needed clinical areas .By conducting workshop, seminars and conferences the knowledge can be updated.

Nursing Administration

- The nursing administrator should take initiative in organizing the continuing nursing education programmes and in-service education programme on newly devised strategies such as intradialytic stretching exercise.
- Patient and family awareness and training sessions can be conducted.
- The nursing administrator should supervise the intervention done for the patients by nurses and also monitor the standards of practice to promote excellence in nursing care.

Nursing Research

- Nursing researcher should encourage clinical nurses to apply the research findings in their daily nursing care activities and can bring out new innovative procedures to reduce the muscle cramps.
- Encourage the non- pharmacological interventions. Nurse researcher can promote many studies on this topic.

- The researcher should conduct periodic review of research findings and disseminate the findings through conferences, seminars
- Encourage the non- pharmacological interventions. Nurse researcher can promote many studies on this topic.
- The researcher should conduct periodic review of research findings and disseminate the findings through conferences, seminars, publications in journals, and in the World Wide Web.

RECOMMENDATIONS

- The study recommends the following for further research
- The study can be replicated with larger samples for better generalization
- The study can be done for peritoneal dialysis patients also.
- The study can be done conducted in different settings with similar facilities
- This study can be done as a longitudinal study
- The study can be replicated with bio- physical parameters
- A comparative study can be conducted between pharmacological and non-pharmacological intervention

LIMITATIONS

- Some patients hesitate to continue this exercise because of severe cramps during haemodialysis

- The investigator could get more of abroad reviews than Indian reviews to support the present study

- The investigator found difficulty to stick over the time schedule due to Doctor rounds.

REFERENCES

BOOKS

1. Abali, C., (2013)**.** Awareness level of kidney functions and diseases among adults in a Nigerian population. Journal of American Science,25(3),158-163.doi:10.4103/09714065.139096.

2. Abdella, (1978). Patient Care Through Nursing Research**.** Third Edition; New york. The Macmillan Publications. Page no: 59-75.

3. Abernethy PJ, Quingley BM. Concurrent strength and endurance training of the elbow extensors. J Strenght Cond Res 1993;7:234-40.

4. Ahsan M. (2004). Prevention of hemodialysis-related muscle cramps by intradialytic use of sequential compression devices. International Journal of Dialysis8(3),283-286.doi:10.1111/j.1492-7535.2004.01106.

5. Allen.R.N, &Richard.N.F, (2005). Clinical dialysis . Fourth Edition New York. Mc.Graw Hill Company. Page no:57-87.

6. Barbara Kozier, GlenoraErb, (2004). Fundamentals of nursing, Concepts process and Practice. Fifth edition; Philadelphia. The Saunders Publications. Page no- 218

7. Bare G.B &Smeltzer, C.S, (2006). Brunner &Suddarth's text book of Medical Surgical Nursing. Tenth Edition; Philadelphia. The Lippincott William and Willkins. Page no: 54-89.

8. Barwel ND, Malkova D, Moran CN, Cleland SJ, Packard CJ, Zammit VA, et al. Exercise training has greater effects on insulin sensitivity in daughters of patients with type 2 diabetes than in women with no family history of diabetes. Diabetologia 2008;51:1912-9.

9. Basavanthappa B.T, (2006). Nursing Research. First Edit ion; New Delhi. Jaypee Brothers. Page no: 81-104.

10. Basavanthappa B.T, (2006). Nursing Research. First Edition; New Delhi. Jaypee Brothers. Page no: 81-104.

11. Betty, M.J& Pamela, B.W, (2005). A introduction to theory and reasoning in nursing. Second Edition; Philadelphia. The Lippincott publications. Page no:70-75.

12. Black, M.J & Jacobs, M.E (1996). Luckmann& Sorenson's Medical Surgical Nursing. Fifth Edition; Philadelphia. The Saunders Publications .Page no: 101-122.

13. Brenner .(2009). Exercise performance by haemodialysis patients. journal of Basic And Clinical Renal Science 37(4),84-96.doi:10.3810/psm2009.12.1746.

14. Canzanello et al. Haemodialysis associated muscle cramps. British Journal of Medicine2006;10.111/j1525-139.

15. Carol L Macnee, (2008).Understanding nursing research. Seventh Edition; Philadelphia; The Lippincott Williams & Wilkins.

16. Chadchavalpanichaya, N et al. (2010). The effect of calf stretching box on stretching calf muscle compliance. Journal of Medical Association ofThailand.93(12),1470-1479

17. Colledge,R., Ralston,H., Walker,R.(2006). Principles and practice of medicine.20th edition. Philadelphia: Churchill Livingstone Elsevier Publication.

18. Cynthia, CN & Pamela K.L, (1998). Joint structure and function a comprehensive analysis. Second edition; New Delhi. Jaypee Brother publications. Page no:58-89.

19. Denise F. Polit,(2008). Nursing Research, Eighth Edition; Wolters Kluwer. Lippincott Williams & Wilkins. Page no: 125-147.

20. Donald A Molony, Jonathan C Craig. (2009). Evidence- based nephrology.1st edition. USA: Willey Blackwell Publication.

21. Gibson, et all, (2001).Trends in the health care services. Second Edition; New York. Mc.Graw Hill Company. Page no:75-84.

22. Gordon LA, Morrison EY, Mc Growder DA, Young R, Fraser YT, Zamora EM, et al. Effect of exercise therapy on lipid profile in patients with type 2diabetes. BMC Complement Altern Med 2008;8:21.

23. Greek, Marek, Monahan, Neighbors, Sands.(2007). Medical surgical nursing health and illness perspectives. 8th edition. Canada :Mosby Elsevier Publication.

24. Hall AJ.(2008) Cramp and salt balance in ordinary life. *Lancet*.2.231-233.

25. Harrisons et al.(2015). Principles of internal medicine. 19th edition.USA: Mcgraw Hill Education Publishers.

26. Henderson JJ,et al,(1992)Medical Surgical Nursing. Ninth edition; Jaypee Lippincott Brothers. Page no: 543 -544.

27. Jeniffer. R.P. Boore, Kathleen Mccann.(2000).Fatigue in persons with renal failure who require maintenance haemodialysis. Journal of Advanced Nursing32(5),1132-1142.

28. Joann L. Lamb, et al,(2000). Handbook of Renal Nursing. First edition; New York. J.B.Lippincott company. Page no: 782

29. Joyce M Black,et al, (2008). Medical Surgical Nursing ,Clinical Management for continuity of care. Fifth edition; New Delhi. Harcourt Brace and Company Asia Private limited. Pageno: 1264

30. Kallenbach J .Z.et al. Review of hemodialysis for nurses and dialysis personnel. Seventh edition. St. Louis Missouri. Elsevier Mosby publications.

31. Kendall, PF, et al, (1993). Muscle testing and function. Fourth edition; Philadelphia. The Lippincott publications. Page no: 221-225.

32. Kenny,J.W,(1995). Overview of selected models, Nursing process application of conceptual models. Fourth edition; St Louis . Mosby publications. page no-18-58.

33. Kirsten, P Koh et al.(2009). Intradialytic versus home based exercise training inpatients. *British Medical Journal*. 10.(2),1471-2369.doi:10.1186/1471-2369-10-2.

34. Kothari L.R, (2001). Research Methodology. Second edition; New Delhi. Jaypee brothers publications. Page no: 56-89.

35. Kutner. N.G, (2001). Psychological issues on end stage renal disease. Advances in Renal Replacement Therapy. First edition; Philadelphia. W.B.Saunders company publishers . Pageno;10-18.

36. Lewis Heitkemper, et al,(2007). Medical Surgical Nursing, Assessment and Management of Clinical Problem. Seventh edition; Mosby Elsevier Publishers. Page no: 784-796.

37. Luckaman Joan,(1993). Medical Surgical Nursing. Fourth edition Philadephia. W.B.Saunders Company. Page no:1222-1237.

38. Martha Alligood et al, (2003). Nursing Theory utilization and application. Second edition; Chicago. Mosby publications. Page no:45-60.

39. Melanie Mc Even, (2002). Theoretical bas is for nursing. First edition, USA. Lippincott publications. Page no: 88-90.

40. Paul, N Bennet et al. (2013). The effect of an coordinated resistance exercise on physical function among hemodialysis patients. British Medical Journal ofNephrology.14.204-206.doi:10.1186/1471-2369-14-204.

41. Polit F, Dennis and Hungler,(2000). P.B. Nursing Research principles and methods. Fourth edition; Philadelphia. J .P.Lippincott publications. Page no: 343.

42. Polit, D.F.,&Beck, C.T. (2008). Nursing research- Generating and assessing evidence for nursing practice. 8th edition. Philadelphia: Lippincott Publication.

43. Rayner, C., & Imai, E. (2016). Approach to Renal Replacement Therapy. Comprehensive Clinical Nephrology,(Fifth Edition). Elsevier Inc. Retrieved fromhttp://doi.org/10.1016/B978-1-4557-5838-8.00090-3

44. Robert ,A Star. (2015) Treatment of acute renal failure. *International Journal of* Kidney, 54.1817-1831.doi:10.1046/j.1523-1755.19980020.

45. Schrier, et al,(2006). Dialysis and Renal transplant at ion. Fifth edition; New York. The McMillan publications . Page no;78-82.

46. Simon, et al.(2001) .Treatment of renal failure- Advance nursing. First edition; Philadelphia W.B.Saunders company .Page no: 48-90.

47. St. evens, (1999). Aspects of renal care. Fifth edition; Philadelphia W.B. Saunders Company. Page no: 92-96.

48. Subhashini N, Dr. Arumugam Indira. Assess the burden among caregivers of patients undergoing haemodialysis in tertiary care hospital, Nellore, International Journal of Applied Research. 2016; 2(4):559-561.

49. Sun, Y.,B., Jia, Q& Wang, J. (2002). The effect of exercise during hemodialysis on adequacy of dialysis. Zhonghua NeiKeZaZhi; 41(2):79-81.

50. Sunder, Rao. (1996). An introduction to biostatistics. 11th edition. Vellore: Orient Longman Publication

JOURNAL REFERENCE

52. American Renal Society. (2002) Guidelines for the Six-Minute Walk Test. *American Journal of Renal Care*. Volume 166. Page no: 111-117.

53. Banerjee.A,et al, (2004). The hemodynamic response to sub maximal exercises during isovolemic hemodialysis. *Nephrology Dialysis transplant Times* .*Volume* 19(12).Page no:320-325.

54. Bennett, et al, (2007). A Haemodialysis exercise programme using novel exercise equipment: A pilot study. *Journal of Renal Care*, Volume 33 (4). Page no:153-158.

55. Burton.J,(2002). The relationship of survival in chronic failure .*Journal of psychosomatic medicine*. Volume 48(3). Page no:261-268.

56. Cappy et al,(1999).The effect of exercise during HD on physical performance and nutrition assessment. *Journal of Renal nutrition.* Volume 9(2). Page no: 63-70.

57. Cheema,B et al, (2005). Exercise training in patient receiving maintenance hemodialysis : a systematic review of clinical trials. *American Journal of Nephrology* , Volume- 25. Page no:353-364.

58. Chubon R,et al.(2005). Quality of life patients with ESRD .*Diagnosis and Transplantation*. Volume 15(8. Page no:450-452.

59. Cukor, et al.(2007). Depress ion and anxiety in urban haemodialysis patients . Clinical Journal of American society of Nephrology .Volume2(3). Page no::484-490.

60. Driks.J.(2005). A world prospective on renal care, the challenges of preventive& Reaction. *EPTNA ERCA Journal*. Volume 31 (2). Pageno:72-74.

61. Dobell E, Peter Williams. (2000) Food preferences and food habits of patients with chronic renal failure undergoing dialysis. *Journal of American Dietary*. Volume 67(2), Page no:80.

62. Edmund,G, et al,(2004). The success of Medicare's ESRD programme .*Journal of medicine*. Volume 305(10). Page no:434-438.

63. Fardy PS Yamoutiz, et al (2007). Kidney rehabilitation- adult fitness and exercise testing .*Medicine Science Sports exercise*. August 5. Page no: 412-415.

64. Fallon et al,.(2000). Stress and quality of life in t he renal transplant patients a preliminary investigation. *Advanced Nursing*. Volume 25(6).Page no: 562-70.

65. Hansen,J .S et al,(2005). Treatment protocol for cramps in ESRD. *Medical library Journal*. volume 31(5) page no: 5-7.

66. Hagren B,et al.(1999) Maintenance haemodialysis : patient's experiences of their life situation. *Journal of Clinical Nursing*. Volume 14(3). Page no: 294-300.

67. Howe, R.C et al.(1978). Analysis of fomic muscle activity & muscle cramps during Haemodialysis. *Journal Of Dialysis*. Volume 2(1). Page no: 85-99

68. KüchleC,et al. (1996). "High-flux hemodialysis postpones clinical manifest at ion of dialysis-related amyloidosis". *American Journal of Nephrology.* Volume :16 (6). Page no: 484.

69. Koda Y, Nishi, et al. (1997). "Switch from conventional to high-fluxmembrane reduces the risk of carp al tunnel syndrome and mortality of haemodialysis patients. *Kidney Internaitonal*.Volume:52 (4). Page no:1096.

70. Naiman N,et al,(2008). Familiarity of Cardiovascular Mortality in End Stage Renal Disease Patients. *American Journal of Nephrology*. Sep18. Volume 29(3). Page no:237-243.

71. National Kidney Foundation,(2002). Clinical practice guidelines for chronic kidney disease: evaluation, classification, and stratification. *American Journal of Kidney Disease*. Page no: 39

72. Philips Kimara.(2000) Psychosocial effects of chronic renal failure .*Nursing Times*. Volume 2(6). Page no:56-7.

73. Goodman, E &Ballou, M. (2004). Perceived barriers and motivators to exercise in Haemodialysis Patients. *Nephrology Nursing Journal*. Volume 31 (1). Page no: 23-29

74. Headley, et al (2002). Resistance training improves strength and functional measures in patients with end-stage renal disease. American *Journal of Kidney Disease*. Volume 40 (2). Page no: 355-364.

75. Koufaki, P., et al. (2002). Effects of exercise training on aerobic and functional capacity on end-stage renal disease patients .*Clinical Physiology*. Volume 22 (2). Page no:115-124.

76. Weinreich T, et al.(2006). "Effects of an increase in time vs frequency on cardiovascular parameters in chronic haemodialysis patients ".*Clinical Nephrology*. Volume- 6 (6). Page no: 433–9.

77. Wait,et al. (2002). Influence of psychosocial fact ors survival of haemedialysis patients. *Nursing times* .Volume 128(4). Pageno:96-99.

78. Williams AW, et al (2004). Early clinical, quality-of-life, and biochemical changes of "daily haemodialysis"(6 dialyses per week).*American Journal of Kidney Disease*. Page no: 90.

79. ZiegertK, (2006). Health in everyday life among spouses of haemodialysis .*Caring Society*. Volume 20(2). Page no:223-228.

NETSOURCES

1) http ://www.med.yale.edu/library/

2) http ://www.webmed.com/content /tools

3) http ;/www.pubmed.com

4) http :/www.medline.com

5) http :www.hesonline.nhs.uk

6) http ://www.ncbi.nlm.nih.gov

7) http ;/www.ct c.gov/nchs

8) http ://www.meds cape.com

9) http ://www.meds cape.com/medline plus/abstract

10) www.nlm.nih.gov/medlineplus /health topics .html

11) www.niddk.nih.gov

13) www.homedialysis cent ral.org

14) www.unos.org

16).www.Yahoo.com

APPENDIX – I

LETTER SEEKING PERMISSION TO CONDUCT MAIN STUDY

From:
301612654
II year M.Sc (N) (Medical Surgical Nursing),
Sre sakthimayeil institute of nursing and Research ,
(J.K.K.Nattaraja Educational Institutions),
Kumarapalayam,Namakkal (dt).

To :

Forwarded Through
The Principal
Sre Sakthimayeil institute of nursing and Research ,
(J.K.K.Nattaraja Educational Institutions),

Respected Sir/Madam,

SUB: **Requesting permission to conduct main study**

I am 301612654 II year M.Sc (N) student of Sre sakthimayeil institute of nursing and Research ,(J.K.K.Nattaraja Educational Institutions),Kumarapalayam. I have selected the below mentioned topic for the research project to be submitted to as the partial fulfilment of university requirement for degree in Master of Nursing .

Title "A STUDY TO EVALUATE THE EFFECTIVENESS OF INTRADIALYTIC STRETCHING EXERCISE ON MUSCLE CRAMPS AMONG PATIENTS UNDERGOING HAEMODIALYSIS AT DIALYSIS UNIT, JEYASEKHARAN HOSPITAL, KANYAKUMARI".

Regarding this project ,I am in need of your esteemed help and co-operation as I am interested in conducting the study in your institution. Hence, I request your good self to kindly permit me to conduct the proposed study under your jurisdiction and provide the necessary facilities for the study .Kindly oblige and do the needful.

Thanking you

Yours faithfully

(301612651)

PRINCIPAL
SRESAKTHIMAYEIL INSTITUTE OF
NURSING AND RESEARCH
KOMARAPALAYAM - 638 183

SRESAKTHIMAYEIL INSTITUTE OF NURSING AND RESEARCH * KOMARAPALAYAM-638183 *

APPENDIX – II

LETTER GRANTING PERMISSION TO COLLECT DATA FOR RESEARCH STUDY

From
301612654
II year M.Sc (N) (Medical Surgical Nursing),
Sre sakthimayeil institute of nursing and Research ,
(J.K.K.Nattaraja Educational Institutions),
Kumarapalayam,Namakkal (dt).

To
The Medical Director,
Jeyasekaran Hospital,
Kanyakumari.

Respected Sir/Madam,

SUB: **Requesting permission to conduct Research study**

I would like to bring to your kind notice that 301612651M.Sc.(N) II YEAR student of Sre Sakthimayeil institute of nursing and Research ,Kumarapalayam, conducting a research on topic

"A STUDY TO EVALUATE THE EFFECTIVENESS OF INTRADIALYTIC STRETCHING EXERCISE ON MUSCLE CRAMPS AMONG PATIENTS UNDERGOING HAEMODIALYSIS AT DIALYSIS UNIT, JEYASEKHARAN HOSPITAL, KANYAKUMARI". For the purpose of submission to the Tamil Nadu DR.M.G.R, Medical University ,Chennai, as a the partial fulfilment of university requirement for degree in Master of Nursing.
I Kindly request you to grant me permission to conduct this study in Huda trust hospital, Kerala. Kindly do the needful.

Thanking you

PRINCIPAL
SRESAKTHIMAYEIL INSTITUTE OF
NURSING AND RESEARCH
KOMARAPALAYAM - 638 183

SRESAKTHIMAYEIL INSTITUTE OF NURSING AND RESEARCH * KOMARAPALAYAM-638183 *

Yours faithfully

(301612654)

APPENDIX – III

LETTER REQUESTING OPINION AND SUGGESSTIONS OF EXPERTS FOR CONTENT VALIDITY TOOL

From
301612654
II year M.Sc (N) (Medical Surgical Nursing),
Sre sakthimayeil institute of nursing and Research ,
(J.K.K.Nattaraja Educational Institutions),
Komarapalayam,Namakkal (dt).

To

Through: The Principal
Respected Sir/Madam,

SUB: Content Validity – Requesting – valuable opinion & suggestions regarding

I am final year M.Sc (N) student of Sre sakthimayeil institute of nursing and Research ,(J.K.K.Nattaraja Educational Institutions),Kumarapalayam. In partial fulfillment of M.Sc (N) programme , I have selected the topic mentioned below for the research project which has to be submitted to the Tamil Nadu Dr.M.G.R Medical University .

Hence I request your good self to validate the tool & give your valuable opinion &suggestions for necessary modification of the same.

"A STUDY TO EVALUATE THE EFFECTIVENESS OF INTRADIALYTIC STRETCHING EXERCISE ON MUSCLE CRAMPS AMONG PATIENTS UNDERGOING HAEMODIALYSIS AT DIALYSIS UNIT, JEYASEKHARAN HOSPITAL, KANYAKUMARI".

Thanking you in anticipation

Encl:Tool

Yours faithfully

(301612654)

APPENDIX –IV

LIST OF EXPERTS

1. **Dr.Mrs.Jamunarani.R.M.Sc,(N),Ph.D**
   Principal,
   Sresakthimayeil Institute of Nursing and Research,
   Kumarapalayam.

2. **Prof.Mrs.Gowri.B.M.Sc,(N).**
   Research Guide,
   Sresakthimayeil Institute of Nursing and Research,
   Kumarapalayam.

3. **Dr.Padmavathi,M.Sc,(N),Ph.D.**
   Principal,
   Dhanvantri College of Nursing,
   Pallakkapalayam.

4. **Dr,Gracy,M.Sc,(N),Ph.D.**
   Professor,
   Dhanvantri College of Nursing,
   Pallakkapalayam..

5. **Mrs.Valarmathi.K,M.Sc.(N).**
   Asst.Professor,
   Sresakthimayeil Institute of Nursing and Research,
   Kumarapalayam

6. **Dr.Jeyasekharan MD MS.**
   Medical Director,
   Jeyasekharan Hospital,
   Kanyakumari.

APPENDIX –V

CONTENT VALITIDY CERTIFICATE

NAME : **Mrs.Padmavathi,Ph,D.**

DESIGNATION : **Principal**

NAME OF THE COLLEGE: Dhanvantri college of nursing

I hereby certify that I have validated the tool of 301612564, M.SC(N), MEDICAL SURGICAL NURSING., II YEAR student Sresakthimayeil Institute of Nursing and Research, Kumarapalayam, who is undertaking the dissertation work on **"A STUDY TO EVALUATE THE EFFECTIVENESS OF INTRADIALYTIC STRETCHING EXERCISE ON MUSCLE CRAMPS AMONG PATIENTS UNDERGOING HAEMODIALYSIS AT DIALYSIS UNIT, JEYASEKHARAN HOSPITAL, KANYAKUMARI".**

Signature of the expert

CONTENT VALITIDY CERTIFICATE

NAME : Mrs.Gracy,Ph,D.

DESIGNATION : Professor

NAME OF THE COLLEGE: Dhanvantri college of nursing

I hereby certify that I have validated the tool of 301612564 , M.SC(N) MEDICAL SURGICAL NURSING., II YEAR student Sresakthimayeil Institute of Nursing and Research, Kumarapalayam, who is undertaking the dissertation work on ” **A STUDY TO EVALUATE THE EFFECTIVENESS OF INTRADIALYTIC STRETCHING EXERCISE ON MUSCLE CRAMPS AMONG PATIENTS UNDERGOING HAEMODIALYSIS AT DIALYSIS UNIT, JEYASEKHARAN HOSPITAL, KANYAKUMARI”.**

Mrs.C.GRAZY.M.Sc.,(N)
Medical Surgical Nursing
RN: 70475 RM:75756

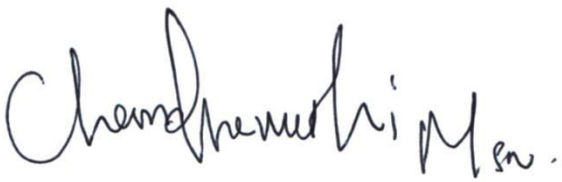
CONTENT VALITIDY CERTIFICATE

NAME: Mrs.Chandramathi,M.Sc,(N)

DESIGNATION: Professor

NAME OF THE COLLEGE: Dhanvantri college of nursing

I hereby certify that I have validated the tool of 301612564, M.SC(N)MEDICAL SURGICAL NURSING., II YEAR student Sresakthimayeil Institute of Nursing and Research, Kumarapalayam, who is undertaking the dissertation work on ," **A STUDY TO EVALUATE THE EFFECTIVENESS OF INTRADIALYTIC STRETCHING EXERCISE ON MUSCLE CRAMPS AMONG PATIENTS UNDERGOING HAEMODIALYSIS AT DIALYSIS UNIT, JEYASEKHARAN HOSPITAL, KANYAKUMARI.**



Signature of the expert

CONTENT VALITIDY CERTIFICATE

NAME : **DR.ABHINESH KARTHIKEYAN.DJ**

DESIGNATION : **MEDICAL DIRECTOR**

NAME OF THE COLLEGE : JEYASEKARAN HOSPITAL, KANYAKUMARI.

I hereby certify that I have validated the tool of 301612564 ,M.SC(N)MEDICAL SURGICAL NURSING., II YEAR student Sresakthimayeil Institute of Nursing and Research, Kumarapalayam, who is undertaking the dissertation work on ," **A STUDY TO EVALUATE THE EFFECTIVENESS OF INTRADIALYTIC STRETCHING EXERCISE ON MUSCLE CRAMPS AMONG PATIENTS UNDERGOING HAEMODIALYSIS AT DIALYSIS UNIT, JEYASEKHARAN HOSPITAL, KANYAKUMARI.**

Signature of the expert

APPENDIX – VI

CERTIFICATE BY THE ENGLISH EDITOR

This to certify that the dissertation entitled **"A STUDY TO EVALUATE THE EFFECTIVENESS OF INTRADIALYTIC STRETCHING EXERCISE ON MUSCLE CRAMPS AMONG PATIENTS UNDERGOING HAEMODIALYSIS AT DIALYSIS UNIT, JEYASEKHARAN HOSPITAL, KANYAKUMARI.** is a bonafied research work done by 301612564,II year M,Sc.Nursing student Sresakthimayeil Institute of Nursing and Research,(JKK,Nattaraja Educational Institutions) Kumarapalayam**.**

Signature of the Editor

APPENDIX – VII

CERTIFICATE BY THE STATISTICIAN

This to certify that the dissertation entitled **"A STUDY TO EVALUATE THE EFFECTIVENESS OF INTRADIALYTIC STRETCHING EXERCISE ON MUSCLE CRAMPS AMONG PATIENTS UNDERGOING HAEMODIALYSIS AT DIALYSIS UNIT, JEYASEKHARAN HOSPITAL, KANYAKUMARI"** has been statistically analyzed under the consultation and guidance of the statistician has been statistically analyzed under the consultation and guidance of the statistician.

Signature of the Statistician

(K. DHANAPAL)

APPENDIX – VIII

DATA COLLECTION QUESTIONNAIRE IN ENGLISH

SECTION - A

Questionnaire regarding demographic and clinical variables

1. Age

a) 20 - 30 years

b) 31- 40 years

c) 41 - 50 years

d) 51 – 60 years

2. Sex

a) Male

b) Female

3. Religion

a) Hindu

b) Muslim

c) Christian

d) Others

4.Education

a)Illiterate

b)High school

c)Higher secondary

d)Graduate

5.Duration of illness

a)0-1 years

b)2-3 years

c)above 3years

6. Life style

a) Active

b) Limited activity

c) Sedentary

PART B

CLINICAL VARIABLES

7. Duration of haemodialysis

a) > 3 months

b)< 3 months

8.Previous experience of muscle cramps

a)Yes

b)No

9. Patterns of muscle cramps

a) Constant

b) Intermittent

10. Frequency of haemodialysis per week

a) Once

b) Twice

c) Thrice

11.When do you experience the muscle cramps during haemodialysis?

a) First hour

b)Middle hour

c) Last hour

12. Measures taken to cope with muscle cramps

a) Walking

b) Distraction

c) Massaging

e) Medications

SECTION- B

QUESTIONAIRE TO ASSESS THE CHARECTERISTICS OF MUSCLE CRAMPS POST INTERVENTION SCORE II Hour III Hour IV Hour CRAMP QUESTIONNAIRE CHART

S.NO	Feature of muscle cramps	Scores	Hour II	Hour III	Hour IV
I	**Frequency of cramps**				
a	Cramps occur 1-2 times	1			
b	Cramps occur 2-3 times	2			
c	Cramps occur 3-4 times	3			
d	Cramps occur 4-5 times	4			
II	**Duration of the cramps**				
a	Cramps occur 1-3 minutes	1			
b	Cramps occur 3-5 minutes	2			
c	Cramps occur 5-7 minutes	3			
d	Cramps occur above 7 minutes	4			

III	**Intensity of muscle pain**				
a	No pain	1			
b	Mild pain	2			
c	Moderate pain	3			
D	Severe pain	4			
IV	**Muscle tone assessment**				
a	Slight increase in tone with the catch	1			
b	Ration of motion present but the minimal resistance	2			
c	More marked increase tone through range of motion	3			
D	Considerable increase in tone passive movement difficult	4			
V	**Quality of muscle cramps**				
a	Mild aching	1			
b	Tingling	2			
c	Burning	3			
D	Throbbing	4			

Scoring technique: Option a- 1, b-2, c-3, d-4 respectively (total score= 20)

Characteristics of cramps	1	2	3	4
	Normal	Mild	Moderate	Severe

Characteristics of cramps is differentiated into

Mild cramps - (< 8)

Moderate cramps - (9-14)

Severe cramps - (15- 20)

APPENDIX – IX

PROCEDURE OF INTRADIALY STRETCHING EXERCISE

INTRODUCTION

The intradialytic stretching exercise which is been given for the patients under experimental group. The exercise is given at the end of first hour of haemodialysis cycle. The investigator concentrates on the calf muscles cramps.

STEPS

Initially, the patient was allowed to bend and extend the lower limbs for warming up.

The investigator then supports the flexed knee joint of the patient and pulls the heel down slowly and flex the foots simultaneously.

The flexion of the foot is maintained till the patient report a feeling of stretch in the calf muscle region.

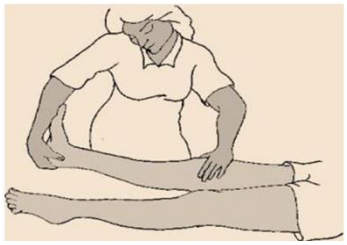
Then, the support of knee joint is released.

The knee joint is slowly pushed down from the flexed position till it is flat. The stretch is maintained for 30 seconds and s lowly released.

This was repeated for three times with rest in between. The exercise was employed for both legs.

The average time taken for exercise was 10-15minutes.

INTRADIALYTIC STRETCHING EXERCISES

Sl.No	Exercise	Description	Picture
1	**Ankle Dorsification**	• Place the non dominant hand over the knee to stabilize the Knee • Place the dominant hand under the heel, with the foot against the forearm, and push the heel downward with this hand. • Hold the position for 20-30 seconds. • Repeat the action for 5 times.	
2	**Gastrocnemius-Passive Stretch**	To stretch one muscle (the gastrocnemius), extend the knee, place the other hand on top of the ankle, and push in the opposite Direction.	
3	**Soleus-Passive Stretch**	To stretch the second muscle (the soleus), flex the knee, place the other hand under the calf, and push in the opposite direction.	
4	**Hamstring Stretching**	**METHOD 1** • Kneel between the legs and support the ankle with your arm or shoulder. • The knee will be straight. • Place one or both hands just above your knee, stabilizing the hip joint. • Raise the leg straight up to approximately 90 degrees. • Hold it for 20-30 seconds. • Repeat the action for 5 times.	

5	**Quadriceps Stretch**	• Flex the knee of the patient until the heel touches his back. • Place the non ±dominant hand over the pelvis to restrict the pelvic rotation. • Hold the flexed knee on the hands and try to extend the hip as much as possible. • Hold the position for 20-30 minutes and relaxes. • Repeat the procedure for 5 times.	

APPENDIX – X

PHOTOGRAPHS

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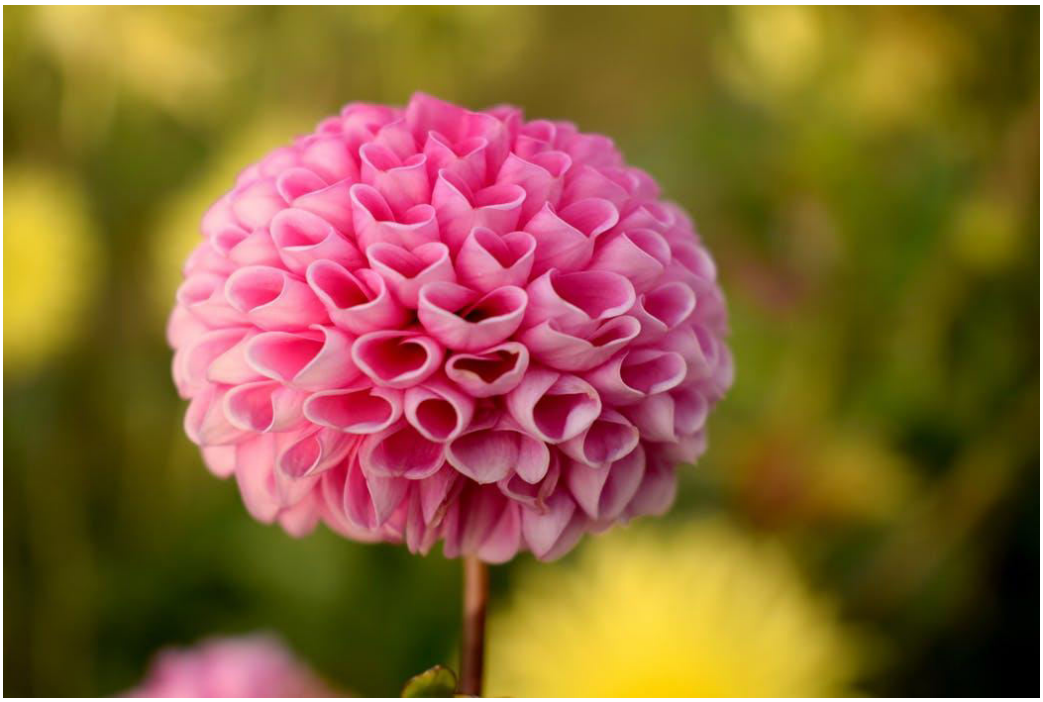

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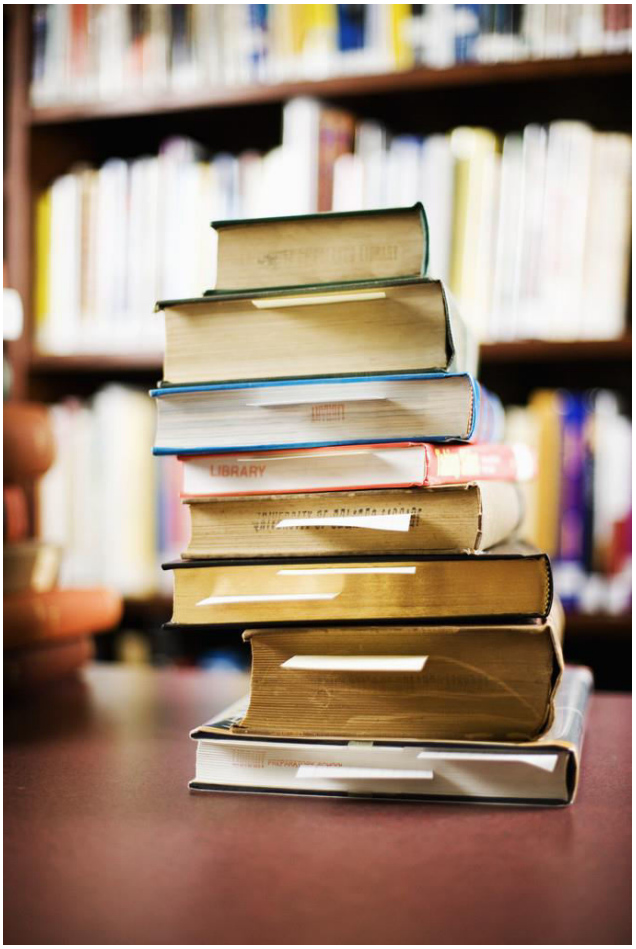

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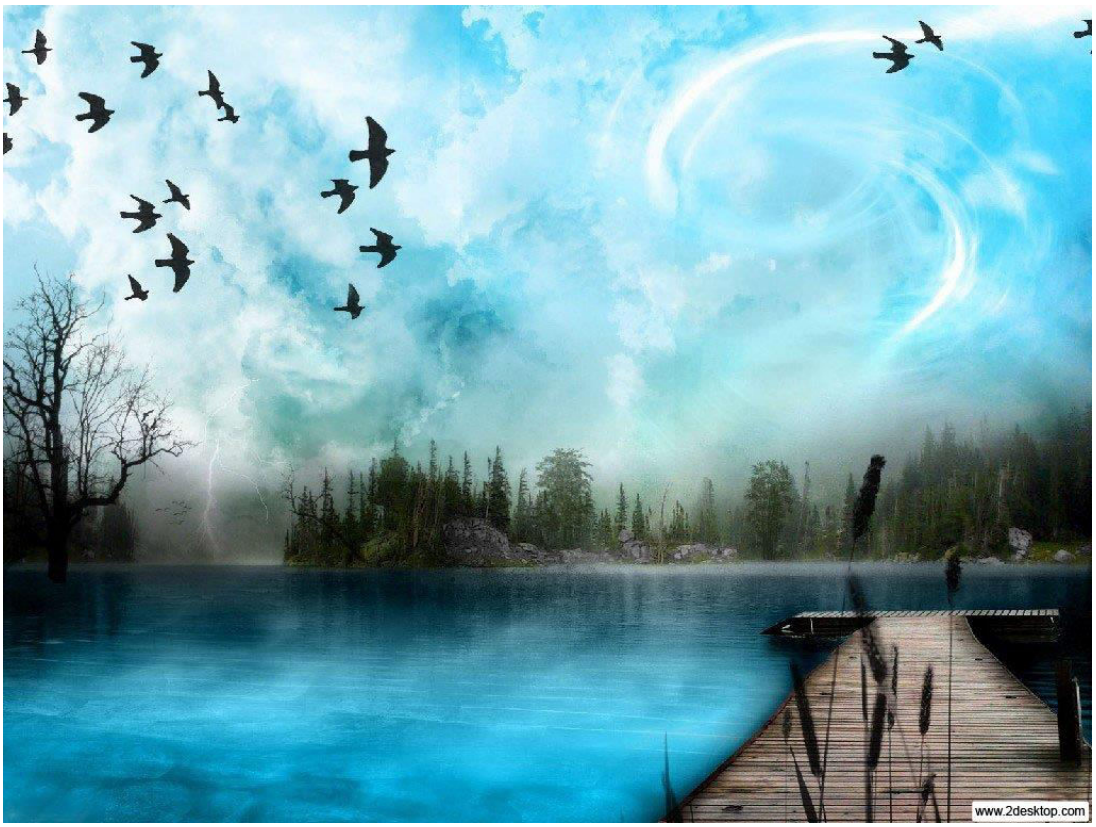

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CHAPTER - VI

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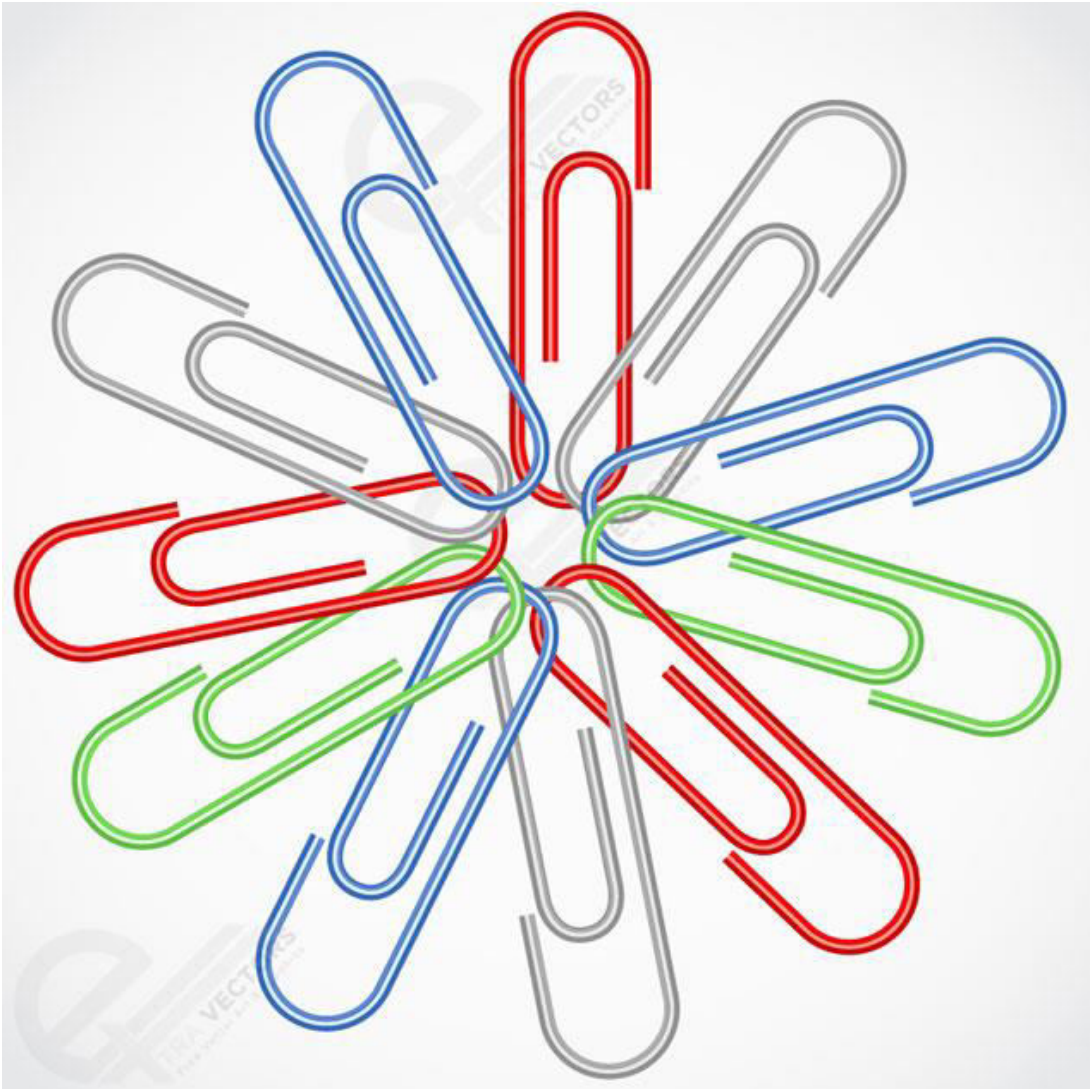

PHOTOGRAPHS